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THE PHILADELPHIA MEETING OF THE INSTITUTE.

A reception to the members of the Institute of Mining Engineers will be given by the Engineers' Club, of Philadelphia, at the rooms of the Penn Club, on Wednesday evening, the 27th inst.

ERRATA.—"DENSIFICATION OF THE GASES."

By some unaccountable mishap, the much-corrected proofs of the article on Densification of the Gases in our last week's issue were not returned to the printer. The intelligent compositor made a few alterations for himself; and the result was disgusting and exasperating in the extreme. The article, as it appeared, was not good chemistry, good English, nor good sense. The writer very much wished it had never been written, and our readers doubtless wished it had never been printed. The moral is that copy must be legible, and proofs must be properly corrected. G.

THE CHICAGO ENGINES.

The *Engineering News* of January 31 comments at length upon our articles of February 17, 1877, and of January 19, 1878, concerning the advertisement, award and successive tests of the West Side pumping engines of Chicago, and promises to return to the subject, if warranted by the interest of its readers. We should be glad to have the *News* return, and we will do our part to make the subject interesting.

Our contemporary mingles personal praise and blame with equal hand. Not often do we write "ill-judged editorials;" it can hardly believe us "guilty of the pettifogging" which our language "plainly implies;" it cannot credit us "with intentions other than to be extremely severe;" but our remarks are "unfortunately discourteous and malapropos;" and we have committed "adroit inuendo" and "sprightly gyrations." We dismiss all this with a single comment. It certainly was our intention to be "extremely severe;" if we did not succeed before, perhaps we shall do better this time; if we do not succeed this time, we will try again. Sooner or later we shall dispel all doubts on the subject, and then our direct severity will not be mistaken in Chicago for "innuendo" or "gyration." But we mean to be severe on a practice, not on persons. When we charge corruption or fraud in any engineering transaction, we shall do so in plain words. Our friends of the *News* need not hunt between the lines to find our meaning. In this case we condemned the *practice* of fixing a preposterous standard of excellence in advance, with a great flourish of restrictions and conditions, and then, inevitably, enforcing these conditions with a laxity most demoralizing to all parties. Now, by way of adding interest to this subject, we call upon the *News* to say whether it approves of this combination of strict requirement and loose construction. Supposing, for the sake of the argument, that the Chicago advertisement had been really excessive in its requirements, and that the tests of the finished machinery had not amounted to the half of what the advertisement threatened, and that the engines finally accepted could not, even by straining their boilers, do what the advertisement called for—supposing all this, would the *News* join us in condemning the policy which made such a result inevitable? In other words, if we were right in our facts, were we wrong in our comments?

Now, as to the facts. The *News* points out, first, that the words of the specification are, "The time occupied [in any trial orders] *may* be six consecutive days of 24 hours each." Not "shall be" but "*may* be." This only makes the matter worse. The force of an option in a written contract is measured by the worst that can be done under it. A bidder under the Chicago conditions would be forced to ask himself, "If I get this contract away from my rivals, and if the city's representations, or the experts, in naming whom I have no choice, should be spurred on, either by personal hostility to me, or by public clamor, or by a high sense of duty, or by a desire to test most severely some new engineering device on which I pride myself, to put me at every disadvantage which the contract permits, what is the worst that they could do?" On studying the advertisement, he would find that his unknown judges could descend upon him at any time during a year's running, without reference to the state of the weather, the coal-dump, or the boilers, and test his engine by a duty trial of six days and nights; and that, under these unfavorable circumstances they could demand a duty of 90 million foot pounds, without deductions for friction or ashes.

Now, is this excessive, or is it not? Have the engines as accepted fulfilled these requirements? Is it not the case that when the engines failed, under a short test, instead of a long one, to reach the stipulated duty, the blame was laid on weather, condition of coal and of boilers, in short, on the very things which the Draconian advertisement professed to eliminate from the case altogether? No cooked-up duty-trial for Chicago! No loop-holes left for contractors! No selecting of coal, no calculation of ashes, no subterfuge of friction, no dubious dodges to explain away failure! Chicago means to have engines that will give a 90 million duty *at any time, without any discount and for a week together.*

Very well; has Chicago got such engines? Were they tested for six days? If the advertisement said *may* instead of *must*, it left the option with the experts to make the test light or severe. Then why did they choose to make it light? In our judgment, because the requirement of the advertisement was preposterous; and it is the whole substance of our criticism that this is a fact which should have been known beforehand. It is better to admit preposterous things than to put them in and then disregard them.

But the *News* says Mr. SKUL's analysis of the test at Lynn was not published till after the Chicago contract had been let; hence we have no right to presume the results of that analysis to have been known to the authors of the Chicago advertisement. This is "extremely severe" on somebody. The Lynn engine was tested in 1873, and the report was published in May, 1874. The Chicago advertisement is dated July 10, 1874. The Lynn report is perfectly full and honest. The criticism which it has received is based on its contents, not on facts discovered outside of it. The charge brought against it was, that it set up a new standard of duty, not usual nor suitable for comparison between different engines. Did Chicago need to wait for Mr. SKUL to point this out? On the contrary, somebody in Chicago evidently saw the point clearly, and *explicitly excluded* from the prescribed duty trial there, some of the objectionable features of the Lynn trial. In other words, because Lynn claimed a high duty on a short trial, with picked coal, and with certain allowances for friction, Chicago ambition aimed at a high duty on a long trial, without selection of coal, and without allowance for friction. The notion that if Lynn achieved a nominal 103 millions in the first case, it was reasonable to demand an actual 90 millions at Chicago in the second, was as absurd in 1874 as in 1876, and would have been absurd if Mr. SKUL had never lived. The assertion of the *News* that the Lynn trial, reduced to a Chicago basis, gives only 98 million foot pounds, is a "gyration" which cannot be maintained for any length of time. The single item of difference between "picked coal" and "ordinary anthracite" overturns it at once.

The ambition to get a higher duty than had been before attained under similar conditions was not reprehensible; but the means of attempting it was so. "May" instead of "must" is an excellent feature in such cases; only the "may" on this point should have been with the contractor. If a practicable duty had been required, and a bonus offered to the contractor for everything achieved in that line beyond the requirement, we think that the result would have been better work for less money.

We pass by all the other American tests cited by the *News*, since, as it remarks, only the Lynn test is available for argument, as being known by published report before the Chicago advertisement. But we beg leave to say that not one of them, if known fully before that advertisement was published, would have justified the stringency of its terms.

We sum up our criticism on this point once more in a single proposition. The Chicago advertisement contained provisions which no engine yet built in America could satisfy, if placed at such disadvantages as the terms distinctly permitted. In other words, no engine could satisfy such conditions unless favorably treated in respects left optional with the Water Board and its experts. As for the immense performances of foreign engines, we have heard of them before; and it is sufficient to say

that the precise copies of such engines, burning anthracite coal and tested by the American method, have invariably failed in this country to reproduce the high trans-Atlantic figures. The article in the *News* proves that even Chicago, without Mr. SKUL's assistance, knows that. The Lowell and Lynn engines are "Simpson engines;" how do they compare with the reported tests at Chelsea and Berlin?

So much for the "cast iron" requirements of duty. Now as to the "india-rubber" enforcement of them. The first trial, in which the engines failed, was, we are told, very expensive and elaborate. Why was the full record of it not published? The *News* has the advantage of having consulted the manuscript, and we must take what it vouchsafes us of the contents. But this is not enough to explain the great discrepancy between the first and second trial, of nearly 20,000,000 of duty. The Commissioners express the opinion that "under more favorable circumstances of operation and weather, and more skillful firing, the engines would have developed a much higher duty." And the *News* actually asks us whether "a much higher duty" would meet the requirements! Since we do not find in the requirements any provision that the trial shall be made under "favorable circumstances," but a distinct decree of what we have repeatedly stigmatized as most unjustly unfavorable circumstances; and since we cannot find anywhere that "much higher" means 20,000,000 foot pounds higher, we "have the hardihood" to insinuate No!

The *News* mentions errors in the gauges, ice and snow in the coal, and "other causes which may have conspired to the general result," as throwing light on the first failure to meet the requirements. We beg our accommodating contemporary to look at the manuscript again, and to inform us whether both engines were tested together in the first trial. That is a fair inference from the portion of the first report which has been published, and also from the explicit directions to the second committee—directions which bear the look of "sober second-thought." At all events, the second report shows that, in the second trial, the engines were, according to those directions, tested separately. In our first article we pointed out that the requirements, as to boilers, were not less absurd than as to duty. Two-thirds of the boilers were to be sufficient to supply the steam required for both engines, the other third being a reserve. Now the six boilers finally accepted aggregate 9,503 square feet of surface for a horse-power requirement of 816, or 11·7 square feet per actual horse power. Two-thirds of this, or 7·8 square feet, is an absurdly low proportion, and we think unprecedented in connection with high duties. Now, in testing the engines separately, was each engine confined to its prescribed proportion of boiler-surface, or was an advantage given in the second trials not given in the first, and was a duty achieved by the engines separately which they could not have achieved togther, even by forcing the boilers? We can assure the *News* that this question is quite as important as that of the weather.

If the first trial was more unfair to the engines than even the unfair specifications required, the proper course would have been to have the second trial made by the same commissioners, and then publish in full the details of both trials. The *News* complains of our statement with regard to two of the commission, that if they "have ever been identified with similar trials, we do not happen to know it." By way of enlightening our ignorance it says there are probably many things that we have yet to learn. This is very true; and it is cruel of the *News* not to go a step further. It need not teach us many things, but one thing: What important duty trials of this kind have the gentlemen referred to ever conducted or assisted in conducting? They are undoubtedly men of ability, and they may be men of ability "in matters of this kind;" but the advertisement provides that they shall possess "*distinguished* ability," which is not only to possess ability, but to have had more than one chance to show it. Have these gentlemen enjoyed such opportunities "in matters of this kind;" and, if so, when and where?

The next point made by the *News* is that nobody was really "bull-dozed" from bidding. In proof of this, the names of eight bidders are given, five of whom "guaranteed the required duty." Does the *News* mean to say that these five bids all accepted the conditions of the advertisement? If so, why was a bid of $185,000 rejected, and the contract awarded at $243,500? The fact is, that most if not all of them contained qualifications and stipulations in mitigation of the hard conditions imposed. The wide range of the bids ($185,000 to $385,000) is a significant fact. Competition is usually very close in such cases. Under proper specifications, it is possible to estimate the cost of water-works engines with considerable accuracy; and, adding a reasonable amount for contingencies and a reasonable amount for profit, ordinarily brings the bidders within a few thousands or some hundreds of each other. In this instance the conditions imposed rendered nearly all of the bids high, and some of them very high. Not only a failure to perform extravagant duty, but the development, in attempting to perform such a duty, of "any important weakness of parts not readily and permanently repaired," would condemn the contractor to refund the money paid and remove all the machinery. This condition is as vague as it is severe. Accidents coming within this phraseology have happened to nearly every important water-engine in the country. Prudent manufacturers would be very likely in such cases to try to get a price which would cover the great risk involved.

In short, we think there are signs of "bull-dozing" even among those who offered bids; while, of course, their names prove nothing as to the prevention of others, who did not bid at all.

We have nothing to do with the personal interests involved in this matter. Such of the engineers concerned as are known to us we highly esteem. The builder of the engines is a reputable manufacturer; the engines will doubtless do all that can reasonably be asked of them. But Chicago has not got what she bragged she was going to get; her bragging has cost her some money, and the foolish device of excessive requirements has resulted in an abatement of those requirements which ought to have taken place before, not after, the execution of the contract.

There is a good deal to be said about the general subject of duty trials as measures of actual working capacity. There is in the case of engines, as of human beings, such a difference between "duty" and performance that the former test, however valuable scientifically, seems to be less practicable for commercial purposes than the latter, by which we mean the actual results of steady running, say for a year. The Chicago contract offered an excellent chance for a test of this kind, and it would be interesting to compare the achievements and expenses of the engines for a year with those of the duty trials. But we will not wander from the main purpose of our argument. We are not condemning the Chicago engines, but the Chicago method of getting them. It is a very good illustration of a very bad practice. We do not asperse the motives, but we do impugn the judgment, of the parties concerned. Above all, we wish to put a stop to the practice. Apart from the case of Chicago, which it may naturally feel bound to defend, will not the *Engineering News* give us in this good work the aid of its usual candor and its unquestioned ability? *

THE PENNY AND THE POUND.

Proverbial literature abounds in keen allusions to the false economy of him who "saves at the spigot and wastes at the bung-hole;" who is "penny wise and pound foolish," etc. Each of us catches the ball and tosses it at his neighbor, rarely ever inquiring whether or not the flying missile were aimed directly at his own head or at a shining mark.

Perhaps it may be worth while to inquire whether the reader of this, be he manufacturer, miner, merchant, or simply householder, is not in many important instances "penny wise and pound foolish." We shall in a special article allude to the lack of economy in our present system of street paving, and shall, in now referring to it, merely cite it as an instance where we have practiced harshest parsimony at the spigot, while the bung-hole ran lavishly at our cost. At this season, one of the most marked instances of penny wisdom and pound folly is shown to be our system (or lack of system) of house-construction, wherein the desire to save the immediate penny is costing us quite early the none too easily spared pound.

It would seem at once an absurdity and a source of alarm that our lives and fortunes are so completely at the mercy of circumstances. As things are, a match, a wisp, a wandering footstep, and a wanton breeze may conspire successfully to destroy a populous city. A carelessly thrown bunch of greasy waste, a badly placed length of pipe, a spark in a dust-laden mill, may initiate an uncontrollable fire.

In self-preservation property owners can (1) "run their chances," (2) insure, (3) maintain fire departments, or (4) build fire-proof. These four modes are here named in the order of their generality of adaption, which order is, strange to relate, exactly the reverse of their true economical value.

"Taking chances" against fire may answer for marble yards, brick kilns, or such like risks, but is hardly to be commended (although widely practiced) for warehouses containing princely ransoms in costly stuffs, or in priceless pictures.

Insurance is highly commendable, but only as an adjunct. It does not comprise the whole sum of duty or of prudence. While the insured apparently receives full value in case of fire, he is paying out money when there is no fire, and is really not only carrying his own risks, but paying a profit to the capitalist. Furthermore, when there are losses, although he receives his indemnity, thereby his income, if a shareholder in some institution holding that insurance stock, is lessened; and even if he holds no such stock directly, he indirectly pays his share of the loss, by that very simple fact that direct destruction of property in any community is always a cause of loss to every member thereof. But still more than this; the insured, even if carrying full nominal lines, seldom actually receives the full indemnity. Suppose there is burned down, in brisk business season, a factory costing, with its equipment, $140,000, and having a productive capacity of $200,000 per year, at a net profit, over expenses and investment, of 10 per cent. The full insurance money is paid, and the loss apparently made up. But it takes six months' time, and absorbs this entire indemnity, to rebuild. During these months the factory could have produced $100,000 worth of goods, at a total net profit of $10,000, and possibly the market of his regular customers has been supplied during this time

by the production of a rival factory, which, once introduced, can with difficulty and expense be superseded. This is not always taken into consideration. In dull times perhaps it is not as effective or popular an argument as in brisk seasons, but "*facta manent*;" it is always true in greater or less degree.

Now as to the third mode—that of maintaining fire departments—local or municipal. By fire departments we mean provision for fire extinguishment; including pails, water and steam-pipes, hydrants, hose, power-pumps, carbonic acid gas generators, hand and steam fire engines, etc. These should pay liberally on the investment and cost of maintenance. A pail of water, a jet of gas, at the right time and in the right place, have saved many an establishment or stock from partial or utter destruction. An additional advantage is that the possession of these safe-guards often lessens immense risks so markedly as to be of advantage solely as an investment. For instance—a stock of goods valued at $800,000, and insured at 2 per cent., is stored in a building worth $200,000, and insured at 1 per cent. Total insurance cost, $18,000. An outfit of extinguishers, pump, hose, and "swift-connecting pipes," etc., costing in all $2,500, will effect a general saving of about 10 per cent. of the insurance premiums; or $1,800 per year as the annual yield from an investment of $2,500.

We now come to the fourth—the most sensible and the best paying of all—the building of fire-proof structures that cannot burn, and that will by compartments "divide the risk" on their contents when the latter are inflammable. Fire-proof construction of isolated structures, pays well; but where buildings are crowded, and each has its risk largely increased by its neighbor, the economy is still more marked, as reducing the rate of insurance-premiums even on almost uninflammable stock, requiring less insurance to be carried; and at the same time (considering each property-owner as his own underwriter) lessening the actual risk.

Suppose that a thoroughly fire-proof building costs 50 per cent. more than an ordinary—that is, dangerous—edifice of the same capacity. We will say that an ordinary non-fire-proof building costing $75,000, and containing $240,000 worth of goods, is insured at 1 per cent.; the goods being rated at 2 per cent.; the total annual cost of insurance is $5,350. An additional construction cost of $37,500, the interest on which at 7 per cent. is $2,625, brings the yearly premium down one-half, or $2,675; but in addition to this, it is really safe to carry less insurance; and the risk of loss of business pending rebuilding in case of fire, is largely eliminated. Furthermore the fire-proof building does not depreciate in value as rapidly as the non-fire-proof.

But in reality the cost of making buildings practically fire-proof need never be 50 nor 40 per cent. more than that of ordinary risky buildings; and frequently there is no extra expense involved in making a building safe from fire. Brick walls are cheaper than stone; metal cornices than heavy wooden; and in many other instances the cost is about equal for fire-proof than for risky materials. As regards the disposition of materials, the advantage is frequently largely in favor of fire-proof arrangement—as, for instance, in ventilators, stairways, windows, etc.

Why, then, will we continue to be penny wise and pound foolish? In America we exhibit this trait more prominently than elsewhere, and its disastrous effects are written in lurid letters of flame in the histories of Boston, Portland, Chicago, and other desolated cities, as also in the lesser chronicles of countless minor fires, whose united destruction exceeds many fold that of the great holocaust of Sardanapalus. G.

NEW PUBLICATIONS.

THE REVISED STATUTES OF THE UNITED STATES. *Relating to Mineral Lands and Mining Resources, with the Circular Instructions of the General Land Office. A Digest of the Decisions of the Department of the Interior, and the Opinions of the Attorneys-General, the Rules of Practice of the Department, a full Collection of Forms, and an Appendix of Special Statutes Relating to Mining. By* WALTER A. SKIDMORE. *Revised and Enlarged.* San Francisco: S. Whitney & Co., 1878. 1 vol. 8vo., 140 pp.

The appearance of a revised and enlarged edition of this very useful manual, so soon after its first publication, is proof of the favor with which it has been received by the public. It occupies a peculiar and important place in the literature of American Mining Law. The treatise of the late Mr. GREGORY YALE, published in 1867, was for a long time almost the only accessible authority. Though it possessed considerable value, yet it was not a complete, systematic manual; and since it appeared, a large number of important points have been settled by the courts, and many importaut changes have been made in the laws. As for the numerous decisions of the Land Office, constituting the semi-authoritative jurisprudence known as "Department law," although they are in many cases entitled to little respect, and are often reversed by judges and juries, it is still highly desirable for the citizen dealing with this department of the government to know its rules and precedents. The recent works of BLANCHARD and WEEKS, are excellent compendiums on the subject for the use of lawyers; but they are perhaps too voluminous, expensive and technical for the use of ordinary laymen. Mr. SKIDMORE'S little manual fills this latter sphere exactly. In addition to the special qualifications for the work, which a long practical acquaintance with mining, and an active experience as an assistant of the U. S. Commissioners of Mining Statistics, have conferred upon Mr. SKIDMORE, the book itself bears witness to his editorial intelligence and skill. It would be a good thing if all authors could begin, as he did, with a practical knowledge of printing and book-making. They would in that case appreciate the importance of proper paragraphing, effective and suitable type, titles appropriately placed and displayed, and thorough indexes. In short, their books, like this one, would please the taste and promote the utmost convenience of the reader.

REPORT OF THE CHIEF OF ENGINEERS FOR THE YEAR 1877. Washington: Government Printing Office. 1877. 2 vols., 8 vo, pp. 1,455.

Although mainly devoted to accounts of the progress of surveys and improvements the Report contains a variety of information on almost every scientific subject, among which mining and geology are by no means neglected. Mr. A. R. CONKLING gives a sketch of Lake Tahoe on page 1,287, which ought not to lie unindexed and unknown, and hence we quote:

"Lake Tahoe is 21 miles long and 12 miles in the widest part. The breadth, however, varies greatly, the southern portion being much narrower than the northern. The shore line is very deversified. The numerous bays, rocky promontories, bold headlands, estuaries and beaches, oftentimes covered with pebbles, remind one of a miniature ocean. Hot springs are found on the north side of Lake Tahoe, near Campbell's Hotel. They rise in granite. Standing on the dock in front of the hotel the observer may see bubbles of gas in several places rising in the clear water of the lake. One spring is inclosed in a brick wall about 3 by 4 feet. The temperature of the water in this spring is 132° F.....The finest scenery is found in the southwestern corner of Lake Tahoe, near Tallac Peak. There is no part of the United States that surpasses this region in scenery. In my extensive travels on the Continent of Europe I have seen but one lake more picturesque than Tahoe, viz., the Lake of Luzerne, in Switzerland. Grace Greenwood, writing from California, says: 'Tahoe is the most beautiful lake I have ever beheld.'"

The same geologist records at length his interesting rambles. On page 1,286 he locates a shaft for a mining company "about twelve hundred feet southwest of the present hoisting works; on page 1,294 he tells how "two men were working at an opening in the ledge seven feet long and four feet wide;" on page 1,299 we hear how "a mining company was organized with Kit Carson as president;" and on page 130 we have a translation concerning the Maxwell land grant "from the pamphlet of Messrs. De Groot and Leembruggen, published in the Dutch language, at the Hague, in 1874," and are sorry to hear that Mr. CONKLING'S "imperfect knowledge of this foreign tongue has been a constant drawback" in his geological studies.

We do not introduce the above to disparage the really excellent work done by many officers of the engineer corps. Gen. COMSTOCK'S survey of the lakes, for instance, is assuming a character that does honor to American science, and which will soon render these reports as valuable as those of the Coast Survey. But that too many important investigations and explorations are intrusted to unskilled hands the published records still show.

A TREATISE ON THE METHOD OF GOVERNMENT SURVEYING AS PRESCRIBED BY THE UNITED STATES CONGRESS. *By* SHOBAL V. CLERENGER, *U. S. Deputy Surveyor.* New York: D. Van Nostrand, 1877. 16mo, 198 pages text and 24 pages advertisements. Price $2.50.

The gilt edges and thick morocco cover of this book are perhaps intended to excuse the poor paper, poor ink and poor printing of the interior; at least, we can imagine no other reason for clothing it in such bright array. The tables of logarithms, sines, etc., which occupy 120 out of the 198 pages, and which are evidently reprinted from the worn-out stereotype plates of some other book, are in particular so illegible that no one would wish to use them who could possibly obtain others. The folding is done so carelessly that many of the pages in our copy have no lower margin at all and on one page part of the bottom line has been cut off.

The 78 pages of the "treatise" give but the most imperfect sketch of the method of government surveying, and scarcely a hint of the principles upon which that method is founded. No law of Congress relating to the subject is quoted or even adequately explained. For instance, the many acts authorizing exceptional methods of subdividing are entirely unalluded to, and the whole question of irregularities is dismissed by saying "how this can best be done becomes the deputy's mathematical problem and a matter to be determined by circumstances." The important subject of keeping field notes is explained in less than one page. No directions are given for adjusting the solar compass, and the transit is summarily disposed of by the remark that it is "rather undesirable, particularly where rapid and accurate work is to be done." The book is dedicated to an Ex-Secretary of the Interior "in memory of pleasant conversations."

The Ironmonger, well known as an excellent English trade monthly, will hereafter appear as a weekly at the same subscription price.

AN EXPERIMENT TO DEMONSTRATE THE REVOLUTION OF THE EARTH ON ITS AXIS.—An experiment was made in 1860, at the Pantheon in Paris, by the learned Leon Foucault, upon the pendulum. A great metallic globe, which hung by a fine wire from the summit of the dome, demonstrated that the oscillatory movements of a heavy mass freely suspended in space remain independent of the rotation of the earth. This pendulum swung very slowly in consequence of the length of its wire, and at the end of each oscillation a point attached to it ate away by degrees a little wall of sand placed there for the purpose of showing the apparent alteration in the plane of oscillation. This experiment, by which—as we may say—the world can be seen to move round, is to be repeated in the Exhibition of 1878, with such new arrangements as to make it comprehensible to the crowd. The pendulum will be 300 kilogrammes in weight, and will hang from a wire 70 metres long, the object of the experiment being to instruct the public in a visible physical phenomenon.

A DECIMAL GAUGE FOR SHEET METAL AND WIRE.

By Robt. Briggs, C. E.

[Abstract of a paper published in the Journal of the Franklin Institute, December, 1877.]

Various standards of measurement, designated as gauges, which are a series of notches of several widths made in the edge of a metal plate, the widths of the notches bearing some relative proportion of gradation from small to large, have become established by time and customary local or trade usage of English metal workers or dealers. These gauges are purely arbitrary, both in dimension and relative proportion of the notches. In regard to dimension, they do not refer to any other unit of measurement—each notch is an original dimension of itself—nor do they have any definite relation to weights of sheets of given superficies, or of wire of given lengths; so that to the unpracticed mechanic of the schools or books, they seem to be "thoroughly senseless," to quote the words of a very intelligent technical author and compiler. As for relative proportion of the gradation, it can be said, after close examination, that there *is* an evident attempt to have the differences of thickness which follow each other, in some manner proportionate—they are the *guess* of the workmen at a geometric proportion of dimension.

The gauges were of local origin at first, and each locality where sheet metal or wire was made or worked, and even each kind of sheet or wire, as iron, steel, copper, brass, silver, etc., had its own trade gauge. This general development of the system of gauges may be fairly claimed to support the "sensibility," if not desirability or necessity, for their existence. Of late years the gauge known as the Birmingham gauge has been perpetuated with much care, and with general exactness of repetition, by the firm of Messrs. "Stubs," of Warrington, England, and has gradually come into use in supersession of most of the other gauges. An especial gauge for brass sheets or wire has held its place in England against the encroachment of the "Stubs" Birmingham gauge, to some extent at least; while in the United States a so-called American gauge has nearly supplanted the brass gauge, and has met with some use in the measurement of iron sheets or wire.

The gauges, all of them, refer to small dimensions relative to the inch, so small that the dimensions cannot be measured by any rule, even one with sixteenth divisions of the inch upon it. With finer divisions, say hundredths of an inch, which have been attainable within the past twenty years, a comparison of a callipered dimension has been possible to the limit of exactness which the $\frac{1}{100}$ of an inch will give. But this degree of accuracy is much below the wants of the workman, who demands that the measurement of thickness shall control the weight of the plate per square foot, or of wire per lineal foot, and even the hundredth of an inch becomes of large value in the differences of the lighter gauges.

There is a real necessity for the *gauge* as a means of measurement, and, more than this, there is a *necessity that the division should not follow the ordinary notation of figures.* An examination of the various gauges of old—the Birmington iron (which is the present "Birmingham"), the Birmingham brass, the Lancashire, the rod gauges—shows that there is a rough approximation to the scale of proportionate dimension throughout them all. The fact is made evident that the workman desired that the next number to any given two numbers or pair, above or below, should be greater or less in thickness in proportion to the increase or reduction which had been established in making the differences of the pair assumed. In other words, the workman did not require a uniform increase as 1, 2, 3, 4, 5; but one as 1, 1 + ¼, 1¼ + ¼ of 1¼, etc.; he *required* not an arithmetic, but a geometric, proportion. Thus, for the purposes of trade, let it be supposed that plates $\frac{10}{100}$ of an inch are wanted for some one use, it is evident that $\frac{1}{100}$ might be a suitable dimension to meet a similar demand for a less requirement of strength of thickness, and that, in practice, intermediate dimensions might not be demanded as merchantable; while descending in thickness by units, until $\frac{1}{100}$ are reached, it is apparent that several merchantable thicknesses ought to exist between this dimension and $\frac{1}{100}$, or half its thickness; and, pursuing the argument *ad absurdum*, it cannot be argued that no metal ought to be kept as an article of sale less than $\frac{1}{100}$ of an inch in thickness, because the numbers run out in units of hundredths of an inch at this point. In mathematical language, the gauges are not expressed in arithmetical notation, but in an exponential one, and the numbers of the steps represent $a\ m^N$, where a is a co-efficient of length or of weight, m is the common ratio or modulus of the system, and N is the characteristic or exponent assumed in any instance.

This law of the formation of a scale of gauges was fully recognized some twenty years since, by Messrs. Brown and Sharpe, of Providence, R. I., who then proposed to correct the discrepant proportions of the Birmingham gauge, by establishing a regular proportion of the 39 successive steps between the 0000 and 36 of that gauge. In this case the value of 0·46 inch has been taken as that for 0000, or the largest dimension of the scale, then by successive uniform decrements, each number following being derived by multiplying the former one by 0·890522 (or deducting 10·9478 per cent.); the final value for number 36 is reached at 0·005 inch, which figure corresponds to number 35 of the Birmingham gauge. This gauge was named the "American" gauge, and has been largely made by the proposers.

But this gauge, with all its correctness of system of proportionate parts, has met with little favor from practical men, and none at all beyond the limits of the trade influence of its makers, whose reputation for accuracy of workmanship in instruments of measurement in other regards, as well as in furnishing these gauges of constant and unimpeachable exactness, has commended a favorable introduction to all American mechanics. The old gauge, to those who use it most, is a scale of dimensions which they think in, as positively as an Englishman thinks in English; its differences are near enough proportionate in the limits of five or six steps to serve to think about, in giving dimensions to a vessel of any kind, and even the irregularities are fixed in the mind so that the error in proportion is measurably removed. A new scale of figures, which in some places differs one or two numbers from the old one, becomes to these men a source of confusion of ideas. To such workmen or users no substitute gauge would commend itself which did not present more advantage than the sentimental one of exact sequence in proportion that had been attained by the adoption of a rate of proportion altogether beyond his ability to comprehend.

The requirements of a gauge, however, have changed in the last fifty years. Uniformity, as one, has been satisfied in degree by the conflict of local gauges, in which it may be presumed that the "fittest," the Birmingham, has survived—although it may be possible that the Birmingham gauge owes its victory to the skill of its advocates and makers, and not to especial fitness. Accuracy has been secured by careful measurement of the gauge spaces, and comparison to the standard linear units of the land. Elaborate tables give the value in inches and decimals of the several dimensions, and also give the exact computed weights of superficies, sheet metal, or lengths of wire of the several metals of commerce.

The requirement of a uniform proportionate gradation of the steps of the gauge may be fully admitted, but whatever proportion is adopted, it should be a simple one. The great use of the gauge to-day is for the purpose of estimate—for calculating the value of given superficies or lengths in weight of material, or *vice versa*, if it can be made more convenient for this end by a new notation or new division of parts, then a change can be advocated and certainly in the end effected.

There are some results from any gauge which must be tabular. The requirement of proportionate sequences leaves but one set of numbers in our arithmetic notation, which will conform; this set of numbers is 1, 10, 100, 1000, etc., where each number is ten times the one before it. This difference is out of the question, and any other proportionate difference leads to interminable figures. It must be accepted, therefore, that with any modulus or difference of ratio between any two steps of the gauge, there can be but *two* points in the scale where an even number can occur, or where any assumption of an arbitrary value will be possible, and if the modulus is established with any rational or aliquot number, there can be but *one* single value in the whole scale which can be expressed in even numbers, or arbitrarily assumed for any value. The values of a series of relatively proportionate sizes must therefore be expressed by decimals, and be derived for practical convenience from a table, and not deduced by special calculation each time. Again, the complicated relation of our English units of weights and measures, together with the various specific gravities of the metals to be gauged, give tabular values for weights which derive exactness only from long extension of decimals, and are utterly devoid of simple expression.

The proposed Decimal Gauge is based upon the successive reduction of an assumed unit of dimension by one-tenth, or, what is the same thing, of successive increase of its divisions by one-ninth.

The establishment of the unit which should be the base of this scale, has been duly considered. This unit has the characteristic number of zero (0), and observation shows, that supposing it is advisable to have the new gauge conform in the main with the Birmingham gauge, then one centimeter = 0·3937079 inches, very satisfactorily fulfills this demand. This value differs one number from the Birmingham one, but this difference gradually disappears in the irregular proportion of the Birmingham gauge, until at No. 8 the two systems nearly coincide. The coincidence continues for 6 numbers to 14, after which the new gauge becomes thicker than the Birmingham, with smaller differences, so that three more numbers are needed in the decimal gauge to cover the same range of thickness.

(TO BE CONTINUED).

A COLORADO GOLD MINE—THE FAMOUS OLD BOBTAIL STRUCK IN A NEW PLACE.

Correspondence of the Engineering and Mining Journal.

The best "strike" made in Gilpin County for many years is that of the present winter on the eastern part of the Bobtail lode proper. This embraces the 460 feet of the vein next east of and adjoining the property of the Consolidated Bobtail Company, being claims 8, 9, 10, 11 and part of 12 east of the discovery claim. But little work has been done there till recently because no ore was found near the surface. The ore vein was finally opened up at a depth of 300 feet, improving somewhat, until the present depth of 600 feet was attained. Levels were then started east at depths of 500 and 600 feet. This was during the past fall and present winter. Up to January 1, principally in November and December, the ore sent to the stamp mills returned $8,419.98 and $3,817.77 was received for ore sold to the smelting works, making $12,237.75 altogether, with a profit of fifty per cent.

The following figures are copied from the certificates of the Boston & Colorado Smelting Company, showing the prices paid for the ore:

	Tons of ore.	Pounds.	Assay per ton. Gold ounces.	Silver ounces.	Per cent of copper.	Paid per ton.	Total.
October 13.....	3	59	5 1-10	16	8	$164	$502.90
"	5	140	3 5-10	12	8	64	324.48
November 3.....	6	1,600	4·05	12	8	76	516.80
"	2	860	8.10	18	8	152	369.36
" 17	2	600	4.40	12	..	91	209.30
" 23.....	1	326	7.90	17	..	145	168.63
December 1.....	4	1,885	6.55	13	7	120	593.04
" 29.....	1	1,350	7.83	14	3	137	229.47
" "	4	1,990	7.50	13	6	135	903.79
Total.....	32	810					$3,817.77

The following were the receipts and expenditures of January, 1878, while simply driving two levels without "stoping" or removing any ore from above or below. The assay value of the richer ore is from $35 to $45 more than the smelter pays.

44 cords of ore milled gave 262¼ ounces of mill retort gold, worth.....	$4,458.28
11¼ tons of ore sold to smelters brought $167 per ton.....	1,879.00
3 tons at $87 brought.....	261.00
Total.....	$6,598.25
Cost of mining, 13 men and steam hoisting works $900; cost of milling $1,100.	2,000.00
Net profit of the month.....	$4,598.00

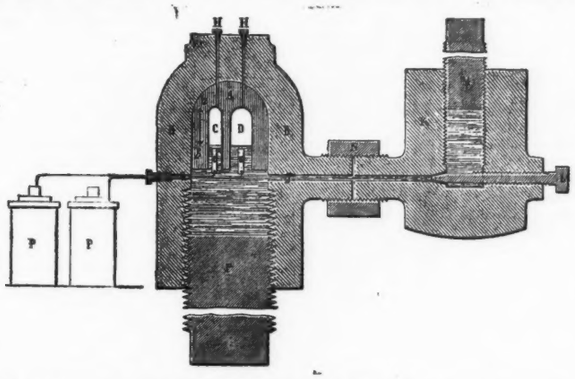
This unusual profit of 70 per cent. is obtained in developing the mine—that is, in running two levels. At present only thirteen men can be employed to advantage. So far, the body of solid ore has varied from two to six feet in width, the latter figure representing the later workings. It will be seen from the above that the mill ore yields over $100 per cord or $14 per ton, while the assay value of the smelting ore in January exceeded $200. During the past week the vein has improved greatly, the last mill run giving $180 per cord or about $26 per ton. The adjoining Bobtail

Company's property pays a profit of $75,000 on ore worth $9 per ton on a total yield of over $300,000. The newly found ore-body mentioned above in the East or Sullivan and La Franz claims, averages from 50 to 100 per cent. richer on both smelting and milling ore, while the vein is as strong, large and continuous as in most parts of the older and more extensively worked properties further west. When the mine is opened for the entire 460 feet by two or three levels, so that nearly 100 men can be employed at "stoping" the rich reserve ore bodies between, the profits will approach 90 per cent. instead of 70, as during the month of January. This ground is likely to cause the yield of the Bobtail lode to double before the close of the year, and it could do that now if anything but the work necessary for development was carried on. It will be seen that 13 miners broke and hoisted ore in a single month that returned $6,598.25 or whose assay value would exceed $7,500 or $577 to the man.

The western extensions of the Bobtail, known as the Minnie and Cashier, are both valuable properties. The former has been giving an average yield of 12 ounces of gold per cord of quartz for the past ten months. The Cashier, which has at times shown an equally good record, will soon be worked again on a large scale. The Bobtail company is still working 200 men and crushing 70 tons of ore daily. This mine is worked by means of a tunnel 1,150 feet long. Just before this tunnel reaches the lode a branch starts off to the west, so as to pass around the Field claim of 33⅓ feet, and has been driven up under Gregory Hill a distance of 1,250 feet. Much valuable ore has been encountered, and at one point the crevice is 10 feet wide.

APPARATUS FOR GENERATING EXTREME PRESSURES.

Mr. A. Bouvet describes, in the *Revue Industrielle* of the 12th, an apparatus for the production of pressures which are limited only by the strength of the materials of which the apparatus is formed. In the accompanying illustration, *A* is a volta meter formed of a block of glass, in



which are screwed two eprouvettes, one of which has exactly twice the volume of the other. *A* is placed in a strong block of metal, *B*. The opening by which the volta meter is introduced is closed by a pressure screw, *F'*. Through a lateral orifice, *G*, are passed a couple of wires, which communicate with the electrodes placed in the eprouvettes. The borings closed by pressure-screws at *H* are for discharging the air contained in the apparatus before the commencement of an experiment; *J*, at the lower part of the block of metal, is a tube by which the interior cavity of the block is put in communication with a reservoir, *K*, closed by a strong screw, *M*, which does the work of a piston and increases the pressure on the interior of the eprouvettes during the operation. Let us suppose that the cubic capacity of the eprouvettes in the space indicated by the dotted line, *a b*, is respectively 1 liter and 2 liters. The entire apparatus is filled with a slightly acidulated water, which has been freed of air, any residue of which passes off at the openings at *H*. The apparatus being closed, a current is passed from a pile, consisting of a sufficient number of elements, *PP;* the positive electrode corresponds to the eprouvette *C*, the negative electrode to the eprouvette *D*. The electrolysis of some part of the water having been effected, and the level of the fluid in the eprouvettes having been brought down, say, to 2, we may conclude that the water contained in them has been transformed into its constituent gases. These gases if they have not been partly dissolved in the water remaining in the apparatus, or if they have not been absorbed by the electrodes which are still immersed in the liquid, will undergo, taking into account the difference of the coefficients of compressibility, a very considerable pressure. This pressure we can easily calculate.

The two eprouvettes, having a total capacity of 3 liters, contain 3 kilogrammes of water. Taking water as practically incompressible, we may say that these 3 kilogrammes of water have been replaced by 3 kilogrammes of gas. Now, 1 liter of oxygen weighs 1·429802; 2 liters of hydrogen weigh 0·179156; the three volumes of gas, therefore, weigh 1·608958, and consequently the volumes of gas thus produced are subjected to a pressure of $\frac{1{,}000\times3}{1{\cdot}608958} = 1{,}854$ atm. ·50. This is a considerable pressure, but it can be easily increased. Turning down the screw *M*, the water in the reservoir, *K*, will be driven in upon the gases, which it will tend to compress. Let us suppose the two eprouvettes have thus been half filled again with water; the gases, having diminished in volume in the proportion of 1 to 1½, are subjected to a double pressure—*i. e.* $1{,}854{\cdot}5 \times 2 = 3{,}709$. We can now pass the current again with the effect of bringing the level of the water down to *b*, by a second electrolysis, and can again proceed to compress the gases. In this way considerable quantities of gas can be acted upon without danger of loss by escape, which it is difficult to avoid, especially with hydrogen, when the pump is used. It will not be too much to repeat the statement with which we commenced—that the pressures to be obtained can be carried up to the limit of resistance of the materials of which the apparatus is composed.—*Iron.*

THE LAKE SUPERIOR IRON TRADE FOR 1877.

The Marquette *Mining Journal*, of the 16th inst., contains a review of the iron industry of the Lake Superior region for 1877, from which we extract the following:

"The amount of the year's product was 1,020,859 tons, and deducting the 57,538 tons smelted at our own furnaces, the value is placed at $3,663,213, computing on the basis of $4 per ton for hard and $2.50 for soft ores. The value of the ore consumed, or still on hand at local furnaces, amounted to $185,152.

"Considering the depressed state of the iron market, the showing is a very good one, the output being considerably larger than we anticipated, though very few of the mines can show a balance on the right side of the ledger. All are struggling along in the hope of a revival in the trade, and but for the hope that is in them not a few mine owners would, we believe, suspend operations entirely.

"Of the outlook for the coming season we can say nothing that is encouraging. Though it is claimed, and truthfully, that very little of the ore shipped to lower lake ports remains unsold, there is little prospect of an increased demand, and mine owners are trimming their sails accordingly. Of the 21 furnaces in the district all are out but three, and there is little prospect of any of the others being lighted in the near future—so the local demand for ores will be lighter than ever before in the history of the district. As usual, too, at this season of the year, Ohio and Pennsylvania furnace owners are haggling for lower prices, claiming that they cannot keep their furnaces in operation, unless they can obtain cheaper ores. On the other hand, our mine owners cannot sell at prices below last year's figures and make a profit, and it is not to be expected that they will be foolish enough to exhaust their capital without receiving the interest which a fair profit represents. We understand that many of them have determined to ship no ore the coming season, except to fill contracts—in other words, are determined to sell their ores before they ship them. In the meantime, most of the work being done at the mines is simply preparatory for the summer campaign, and the season will open with less ore mined and ready for shipment than at the opening of navigation in any of the past six or seven years. The mines will, however, be in the best possible condition for rapid work, and the output of last year can be reached, should the demand come early enough in the season. From all the information we have been able to get, however, we are led to the conclusion that the close of the year will show a marked decrease as compared with 1877. This will certainly be the case if furnace owners hold their orders back until it is too late in the season to make up for lost time.

"The following is a statement of the pig iron shipped from Lake Superior furnaces in 1877, together with the value:

Name of Furnace.	Gross tons.*	Value.	Name of Furnace.	Gross tons.*	Value.
Carp River	3,094	$67,974	Fayette	2,632	$55,272
Pioneer	3,467	72,807	Menominee	5,343	112,203
Marquette and Pacific	6,856	143,976	Bay	4,250	99,250
Morgan	663	13,923	Munising	3,280	68,880
Cliff	100	2,100			
Total				29,685	$636,385

This table shows the aggregate shipments of pig iron from the Lake Superior furnaces from 1858 to 1877, inclusive:

Name of Furnace.	Gross tons.	Name of Furnace.	Gross tons.
Pioneer	115,859	Bay	50,706
Northern	15,059	Munising	28,312
Collins	41,997	Grace	11,346
Michigan	41,531	Marquette and Pacific	39,250
Greenwood	40,202	Escanaba	8,650
Bancroft	54,618	Ishpeming Peat furnace	1,150
Morgan	57,573	Carp River	5,539
Champion	31,048	Menominee	20,850
Deer Lake	26,684	Cliff	7,390
Fayette	86,724		
			684,488

The following is a statement in gross tons of the aggregate yield of the mines and furnaces of this district from 1856 to 1877, inclusive, together with the value of the same:

Year.	Iron Ore.	Pig Iron.	Ore and Pig Iron.	Value.
1856	7,000	.....	7,000	$28,000
1857	21,000	.....	21,000	63,000
1858	31,035	1,629	32,664	249,202
1859	65,679	7,258	72,937	575,529
1860	116,908	5,660	122,568	736,496
1861	45,430	7,970	53,400	419,501
1862	115,721	8,590	124,311	984,977
1863	185,257	9,813	195,070	1,416,935
1864	235,123	13,620	248,955	1,867,215
1865	196,256	12,283	208,539	1,590,430
1866	296,972	18,437	315,409	2,405,960
1867	466,076	30,211	496,987	3,475,820
1868	507,813	38,246	546,059	3,992,413
1869	633,238	39,003	672,241	4,968,435
1870	856,471	49,298	905,769	6,300,170
1871	813,379	51,225	864,604	6,115,895
1872	952.055	61,195	1,015,250	9,188,055
1873	1,167,379	70,507	1,238,886	11,395,887
1874	935,488	86,494	1,025,982	7,592,811
1875	910,840	81,753	992,593	5,788,763
1876	977,233	61,911	1,039.144	5,397,785
1877	960,982	29,685	990,667	4,299,598
Total	10,492,334	684,488	11,176,822	$78,852,877

REVIEW OF THE CALIFORNIA MINING INDUSTRY FOR 1877

(*Continued from page* 109.)

"*Butte County.*—While mining operations have been somewhat retarded here by reason of the drought, they have not suffered so much in Butte as in most other parts of the State, the rain-fall being always greater here than in the mining counties further south. The Spring Valley Company, who carry on the most extensive mining operations in Butte, and who have been engaged in making many costly and valuable improvements during the year, have at the same time turned out a large amount of gold dust. The expenditures made first and last upon this property have been very heavy, aggregating nearly a million dollars. The construction of their main ditch, 80 miles in length, entailed an outlay with its append-

* 2,268 pounds.

ages of $300,000. After they had introduced water upon and outfitted their mine, the company were forced to purchase a large tract of land lying along Dry Creek below their works, in order to avoid litigation with the owners, who were threatening them with suits for damages done their lands by the hydraulic tailings. This land, which covered an area of 16,000 acres, cost, with the levee and other works designed for its reclamation and improvement, hard upon half a million dollars. But the investment is likely to prove a good one, this entire tract, under the system of culture adopted by them, producing all kinds of crops in the greatest abundance. Their gravel lands, which comprise several hundred acres, rich in gold, are worked on an extensive scale, water, during the season it is most plentiful, being played upon it through six or eight large giants, and as many as a hundred men being employed in and about the mine, which makes an annual average production of half a million dollars.

"Among other mining properties in this county that may properly be noticed is the Hendricks Hydraulic Claim, at Morris Ravine, upon which, purchase money included, there has been laid out about $400,000. The ditch, alone, 40 miles in length, built to bring water from the West Branch of Feather River, cost $150,000. The iron pipe which forms for two miles a part of the aqueduct, is twenty-two inches in diameter, and cost $30,000. The tail flumes, among the largest and best constructed in the State, cost about $35,000. This company, like the Spring Valley, near by, were able to keep up washing on a restricted scale throughout the entire year, notwithstanding the drought. In many parts of the county, however, as at Bidwell's Bar, Wyandotte, Thompson's Flat, etc., washing was considerably curtailed by reason of the dry weather.

"To the Chinese, several thousand of whom are engaged in mining in this county, the drought was a benefit, as it enabled such of them as were working in the surface mines about Oroville to sink to greater depths than usual, and also favored those who were busy turning or wing-damming the rivers, a style of mining that the people engage in quite extensively.

"On the Hewitt Hydraulic Mine, near Oroville, about 1,500 inches of water were used, and some twenty men kept employed during a part of the season, the earnings of the mine having been satisfactory to the owners. The Powers, covering an immense tract of auriferous gravel, the Oroville, the Cherokee Flat, and the San Francisco, are all hydraulic mines of good promise, the most of them owning ditches for supplying their claims with water, and all being well outfitted as regards pipes, tail-sluices, under-currents, etc."

East of the Sierra Nevada lies the mineral regions of Alpine, Mono and Inyo Counties; a section of country in which mining operations have to be prosecuted under many disadvantages, such as costly transportation, a barren soil, and a severe winter climate, and in many parts destitution of water and timber. These latter drawbacks do not, however, apply to Alpine County, which is well situated as regards both these necessary aids to mining. Still, as a bullion-making country its record is a bad one, not a mining district east of the Sierra having returned so little for the assistance and encouragement it has received as this. * * * * During the past year, work has been begun again upon several claims in this county, in some cases after a protracted interruption. Operations have been in progress on the Advance, I X L, Exchequer, Lady Franklin, Sunnyside, Washington, Mountain and two or three others, generally in a small way. Bullion remittances from Alpine, as in years past, have not, however, exceeded a few thousand dollars.

In Mono, the adjoining county, a number of extremely rich and promising gold-bearing lodes have been struck and partially explored during the past year. This county, like its neighbor, has been for many years under a cloud, all but a few of the best claims having been neglected almost to the point of abandonment. Here, however, the trouble had always been a want of sufficient capital to accomplish anything like thorough work, the veins, so far as opened, generally prospecting well in free gold.

Placers of unlimited extent, but tolerably remunerative, were worked in this vicinity as early as 1858, but not until three years after, during the Esmeralda excitement, were the present mines discovered and taken up. Being in the hands of poor men, the work of their development proceeded slowly, and but little was heard or expected of them until a year or two since, when the Cook Brothers, of San Francisco, the energetic promoters of many large and successful mining enterprises on this coast, acquiring ownership of one of these locations known as the Standard, proceeded to open it up in their usual vigorous and effective way, and with results that have probably surprised even themselves.

This, the most conspicuous mine here, and that which, more than all others, has imparted to Bodie its new-born fame, is an early located claim, covering 1,500 linear feet on the main lode in the district. Since it came into the hands of the present chief owners, a little over a year ago, this mine, about which nothing had been heard and from which comparatively little ore had been taken before, has yielded enough bullion to cover the price of its purchase, the erection of a 20 stamp mill and steam hoisting works, also of ore extraction and reduction, extensive exploration and other current expenses, including the building of an elevated tramway, the whole involving an expenditure of at least $150,000, besides paying to the stockholders three monthly dividends of $1.00 per share, amounting to $150,000 more. From the net earnings of their mine the company have in their treasury a large surplus fund, and it is expected that the above rate of dividends will not only be kept up but be largely increased, as they contemplate the erection of an additional mill, and are said to have established ore reserves to the value of $2,000,000. The pay chimney developed in this mine is 800 ft. long, and from 4 to 5 ft. in width, the ore being gold-bearing, free and easily worked, and yielding at the rate of about $60 per ton. The pay chute has held from the surface to a depth of 825 feet, the lowest point to which the vein has been opened up, the ore steadily improving in quality in a downward direction. They might, by a little assorting, run their mill on a much higher grade ore, but prefer working the bulk of it as they go along, none being rejected that will pay even as much as $40 per ton, all below that, of which they have a good deal, ranging from $15 to $20 per ton, is reserved for future reduction when, through lessened cost and improved methods, it can be worked with profit. The cost of getting out and reducing the ores here average at present about $10 per ton, fuel constituting the gravest item of expense. Having sunk an incline on the lode to the above depth, where the water became troublesome, the company have commenced sinking a new vertical shaft, which will cut the lode on its pitch at a considerable depth. This shaft, which is already down 100 feet, consists of three compartments, being designed for hoisting, lowering and pumping purposes.

While the Standard, because of its more thorough exploration, may be accounted the leading mine in Bodie, there are still a number of others that show excellent indications of wealth, and some of which may yet prove themselves its peers when they come to be opened. To this class belongs, judging them by their local representation, the Bulwer, Bodie, Homestake, from which some $400,000 have already been taken, the Red Cloud, the White Cloud and two or three others, there being also a number of tunnel locations in the neighborhood, considered valuable because of the lodes connected with them, or which it is believed will be developed in the course of their construction.

(TO BE CONTINUED.)

THE NEW WORKS AT CLAUSTHAL FOR DRESSING ORES.

By John C. F. Randolph, E. M.

[*Continued from page* 114.]

(WITH SUPPLEMENT—NO. II.)

[Presented at the Amenia Meeting of the American Institute of Mining Engineers.]

THE DRESSING MACHINERY.

The apparatus with which the establishment is equipped now demands our attention. This may for convenience be classified under three heads: I. *Machinery for reducing the size of the ore;* II. *Apparatus for sizing and classifying the ore so reduced;* III. *The jigs; and* IV. *Other concentrating apparatus.*

I. *Machinery for reducing the size of the ore.*—This consists of three classes of machinery—rock-breakers, rolls and stamps. The *rock-breakers* are the Hanover variation of Blake's machine so much favored in Germany. They are six in number, with a capacity of 5—7½ tons per hour each when crushing the large ore to 64mm* Their breaking capacity therefore exceeds that demanded by the amount of ore coming to them.

The Crushing Rolls.—These are all of similar construction, and consist of a cast-iron shaft with a conical seat, on which the crushing face, which has been trued both inside and outside, is secured by a screw at the ends. On account of the large consumption of crushing surfaces in the works, careful comparative experiments have been made with faces of cast iron, chilled iron, Bessemer steel, crucible steel and hammered cast steel. The results of these experiments seem to warrant their present preference for crucible steel as best meeting the two requirements of durability and medium cost. The pillow-blocks in which one of the rolls moves are movable, with india-rubber buffers pressing against them. On the prolongation of the axes of the rolls are toothed wheels, working in one another. The power is laid on by a pulley driving intermediate gearing. The construction of these rolls is in no way peculiar. There are three sets of coarse rolls in the works, with room for a fourth set if it is at any time needed. These coarse rolls are 760mm in diameter, with a face 300mm long. The rolls are set 18mm apart, and make 24 revolutions a minute, with a capacity for each pair of 5½—7½ tons per hour. The middle and fine rolls, of which there are six sets of each, are of similar construction, but of a diameter of only 380mm and the same length of face. Of these the middle rolls are set to crush to 6mm, and the fine rolls to 2mm, and both classes of rolls are given a velocity of 60 revolutions a minute, with a product of from 2½—3 tons an hour. The following table gives these details in tabular form:

	Number of sets.	Diameter.	Face.	Revolutions per minute.	Crushing to	Capacity per hour.
Coarse Rolls....	3	760mm	300mm	24	18mm	5—7½ t.
Middle Rolls....	6	380mm	300mm	60	6mm	2½—3 t.
Fine Rolls	6	380mm	300mm	60	2mm	

The Stamps.—There are in all 176 stamps in 8 batteries of 22 head each. The original plant of 120 stamps was found in 1875 to be insufficient for handling all the material coming to them for fine reduction. For three years, therefore, a portion of the middle products from fine jigging had to be thrown away. This has now been obviated by increasing the number of stamps. They have heads and dies of soft iron, with wrought-iron stems, and cast-iron mortars. The total weight of each stamp including stem, head and tappet, is from 200 to 215 kilogrammes. They are driven by cam shafts which are separate from the frame after the usual German method, to which power is transferred by belting and a large band wheel. The cams are double. No data is at hand as to the present practice as to the number of drops a minute or the height of stroke. The number of drops per minute is probably lower than the best American practice, if it follows the usual practice in the Hartz. Each battery is supplied with Rittinger's "Stausatz" above the screens for drawing off chips, shavings, straws and other woody matter, from which it is almost impossible to keep ore free, and which are such a continual annoyance by clogging the screens, etc., when working without this simple arrangement. This "Stausatz" is so well known as to need no description here. The water for stamping is introduced on the front above the "Stausatz" and screens. The ore is fed from the floor above at the back of the stamps into a series of large stationary hoppers, the sides of which toward the stamps are vertical, and the other side oblique. These hoppers have a feeding slit at the bottom of the vertical side, which is alternately opened and closed by a sliding plate moving horizontally back and forth by means of a simple connection with a line of shafting. The velocity of this sliding plate is 43mm per minute. The ore thus escaping from the hopper slides down a short inclined trough into the mortar. This same feeding arrangement is used for the coarse rolls, as it permits a large amount of ore to be stored in the hopper, which is of importance when the intervals of charging the hopper are long, as in that case, on account of the distance the ore has to be brought.

II. *The Sizing and Classifying Apparatus.*—With the exception of some bar grates used for coarsely dividing the crude ore coming to the breaker house, and the material coming from the middle rolls, all the sizing apparatus consists of revolving drums or screens. The grates need no description. In the breaker house they consist of bars set 64mm

* 1 inch = 25.4mm.

apart, and are six in number. In the middle and fine crushing house the grates are beneath the middle rolls, with openings 4mm apart, and have the object of separating the material falling from the rolls which is already fine enough for fine jigging, from the coarser particles, which are pushed off the grate down a trough into the fine rolls for further reduction. The *sizing drums* are of two classes—(1), conical, with horizontal axes; (2), cylindrical, with inclined axes, of which the larger portion belong to the first class. They are all of the usual construction, having an internal axis, with rings at intervals, on which sockets are cast, in which radiating iron arms fit. These arms are connected at the outer ends by circular and straight wrought iron bands, and are covered by a perforated metal screen of appropriate material. All the perforated screens are of sheet iron, except those with holes 1mm, which are sheet copper. These screens are single and in sets of three or five each, according to the purpose for which they are used. In the breaker house there are 12 single conical screens, with horizontal axes, and sides inclining 1:24. Of these, six are beneath the grates for washing and rough sizing the grate smalls, and six are on the opposite side of the building for dry sizing of the smalls from the breakers above. Those for wet sizing are 2·75m in length, and those for dry sizing 1·83m, and all have the same diameters of ·83m and 1·07m for the ends. They are all covered with perforated sheet iron with holes of 32mm, and make 12 revolutions per minute, with a capacity of 2½—3½ tons per hour for each.

In the coarse separation house (marked 1 on the plan of the works) and the two coarse crushing houses (marked 6) are found the *coarse sizing drums* in sets of three each. Four of these sets are in the coarse separation, and in the two coarse crushing houses four and two respectively, or ten sets of coarse sizing drums in all. These coarse drums are all cylindrical, with axes inclined 1:24, and each set is arranged in a descending series, one below the other, on a line of about 45° The upper drum is larger than the others, being 2·75m long and ·9m in diameter. The two lower ones of the set are 1·83m long and ·6m in diameter. The upper one is divided in three equal parts, each of which is covered with a perforated sheet iron screen, the holes of which are respectively 32mm, 17·78mm and 13·34mm. In like manner the second and third drums have each two screens with holes 10mm and 7·5mm in the second drum and 5·62mm and 4·22mm in the third. The second and third drums are geared together by toothed wheels at one end, and are driven by the same belt, moving in different directions, but the upper drum is driven by a separate belt of its own, going in the same direction as the lower one of the set. They are all driven at 12 revolutions per minute, and each set sizes from 3½—5½ tons per hour.

In the small separation house and the middle and fine crushing house are found the *fine sizing drums* in sets of five drums each. There are two of these sets in the former and six in the latter building. All the fine drums are conical, with horizontal axes, and sides inclining 1:24. The five drums constituting a set are arranged in pyramidal form, one drum forming the apex and two drums below on both sides. On the end of each is a gear wheel by which motion is transferred from one to another—the direction of the motion being of course reversed at each transfer. The power is applied to the lower one of each set by a belt and band wheel. All the drums of a set have the same dimensions, being 1·83m long, and ·6m and ·7m in diameter for the two ends. Four drums of each set are covered with perforated sheet iron, but the fifth (1mm) is covered with perforated sheet copper. The sizes of the holes of the various drums are 3·16mm—2·37mm—1·78mm—1·33mm—1mm, and the drums are arranged so that the middle one, with 1·78mm holes, forms the apex and receives the ore to be sized. The material passing this screen goes to the finer drums on one side, and what the screen refuses goes to the coarser drums on the other side. This is quite a usual arrangement for a large set of drums. The following will show sufficiently plainly the arrangement of the drums according to the sizes.

1·78mm.
3·16mm. 1·33mm.
2·37mm. 1mm.

All above 1·78mm going to the 3·16mm drum, which refuses all above 3·16mm, which goes to its bin, while the portion below 3·16mm falls into the 2·37mm drum, by which all between 2·37mm and 1·33mm is passed, and all between 2·37mm and 3·16mm is refused.

The sizes furnished are therefore

I. All between 4·22mm and 3·16mm,
II. " " 3·16 " 2·37
III. " " 2·37 " 1·33
IV. " " 1·33 " 1
V. 1mm and under.

The following table shows these details of the sizing drums arranged for reference and comparison:

SIZING DRUMS.

Use.	Number.	Shape.	Axis.	Length.	Diameters.	Revolutions per min.	Holes.	Capacity per h.
				m.	m.		mm.	
Washing and sorting grate smalls.....	6	Conical	Horizontal	2·75	·83—1·07	12	32	2½—3½ t.
Sorting breaker smalls....	6	Conical	Horizontal	1·83	·83—1·07	12	32	2½—3½ t.
Course sizing in sets of 3.	30	Cylind.	Inclined...	2·75 1·83 1·83	·9 ·6 ·6	12	32-17.78-13.34 10—7.5 5·62—4·22	3½—5½ t.
Fine sizing in sets of 5....	40	Conical	Horizontal	1·83	·6—·7	12	3·16 2·37 1·78 1·33 1	?

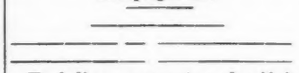
The *Apparatus for Classifying* material too fine for sizing by screens—viz.: sands and slimes—consists of zinc funnels beneath some of the drums, various series of spitzkasten and the classification sets in the stamp house and the auxiliary washing house.

The action of all these apparati is a classification by deposition according to gravity, by which the heavier coarse sands settle first, the lighter coarse ones afterward, the heavy fine particles next and the light fine ones last of all. To a limited extent, the action is also one of sizing. Of these appliances the *zinc funnels*, or *spitz trichter*, are more collectors than classifiers. They are placed beneath the last drum of each set of coarse and fine sizing drums, for catching in the first instance all material below 4·22mm, and in the second case all material below 1mm. There are consequently ten of them connected with the coarse drums and eight with the fine drums. They are made of sheet zinc to better avoid corrosion, and are approximately ·6m×·6m square at the top by ·4m deep. The material accumulating in them is drawn off periodically. That from the coarse drums is considerable, and goes off by launders to the fine drums, while that from the fine drums is small in amount and goes to sand jigs. The water flowing over the edge of the funnels is led in the first case by launders to series of spitzkasten, but in the second case it goes into clearing tanks under the floor.

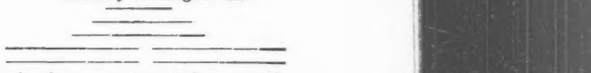
Of ordinary spitzkasten, for settling the slime in the turbid water from the zinc funnels, there are two sets outside the coarse separating house of six each, and two sets of two each in the middle and fine crushing house, or in all, 26 spitzkasten. In size those belonging to coarse separation are approximately 2·7m×2·7m on top by 2·8m deep each, and the others 2·8m×1·8m on top, by 2·2m deep. None seem to have been placed in the coarse crushing houses where they are equally applicable.

Of *Classifiers* there are in the stamping house four sets of six pointed boxes each, and in the auxiliary washing house three sets of seven each, arranged in an increasing series. The first is the smallest, the next below is double in size, then come a pair which together are double the preceding in width, and finally a similar pair. In the washing house, three single ones come first and then two pairs. The arrangement in the two cases may be represented as follows:

Stamping House.



Auxiliary Washing House.



Each line represents a classifying box—in form an inverted pyramid. The data as to their dimensions can be drawn from the plates which will appear in connection with this paper. As only rough approximations can be obtained in this way, they are consequently not introduced here. These classifiers have not been satisfactory, and are liable to be supplanted at any time. This is the apparatus that was invented by Meinecke.

The last apparatus of this character to be noted are the *Rittinger Spitzkastens*, whose introduction in the Hartz is a new feature. One set, of six each, takes the turbid overflow from each set of classifiers. There are, consequently, 4 sets of them in the stamp-house, and 3 sets in the auxiliary washing house. Their dimensions are 2m × 2m on top and 1·8m deep, and their purpose is to settle and classify the slimes for the buddles.

III. *The jigs, buddles and tables, and apparatus belonging to them.*—*The jigs* in these works form a very important and extensive portion of the concentrating apparatus. They are all of the type known as Hartz jigs, and with but few changes in construction and methods of use represent the best practice in this region for the last 10 years. The accompanying plate will be of service in referring to them (Plate II.). There are in the original equipment some 71 jigs of the same type, and varying principally in the number of sieves and pistons, the number and length of strokes per minute, the method of jigging, the size of mesh and the method of discharge. We will first, for convenience, notice the points they all have in common, and then the points in which they differ.

They are all stationary sieve, side piston jigs, with the piston in the back compartment, and the sieve on which is the material to be jigged in the front one. These compartments are separated only at the top and connect below. They are all provided with one piston for each sieve, and each sieve receives its jigging action by the upward impulse given by the water to the ore on it, by means of the piston belonging to it. They are all continuous working jigs, both feed and discharge being continuous. In jigging they all work with the down stroke of the piston slightly faster than the up stroke. In all of the jigs the water is introduced either directly into the piston compartment above the piston or into the same compartment from an overflow box supplied by a pipe with a faucet to regulate the flow.

They are dissimilar in the following general points:

(1) The method of imparting motion of the proper character to the piston is attained in two ways. The first method is common to all the coarse and fine jigs, and is shown in side elevation in Figs. 31, 34 and 41. On the end of the driving shaft belonging to the jig is a disc on which a connecting rod is geared eccentric. This connecting rod engages a short horizontal lever, which fulcrums on a secondary shafting allowing its end to move up and down as the connecting rod rises and falls. To this lever, between the fulcrum and the power, is suspended the piston rod to which the piston is hinged. The length of the stroke depends on the distance the connecting rod is placed off the centre, and also on the distance from the fulcrum at which the piston rod is attached. The other method is shown in Figs. 25 and 26, and is used with many of the sand jigs. It consists in connecting the piston rod directly with the power shaft of the jig by an eccentric at the top. The figures explain themselves. The first is indirect and adapted for longer and slower strokes than the second. The total abandonment of jigging sleeves is interesting in this connection. The first method is actually a substitute for the sleeve, producing in a less cumbrous manner the same motion, and is less liable to get out of order. (2) The methods of continuous discharge are of three different types. The first is represented in side elevation in Fig. 23, and consists of the well known discharge under and over a cap and sill. The cap is lowered by thumb-screws, so that only the concentrated lowest layer on the sieve can pass into the inclined launder below it, built into the body of the jig. In order to discharge under the cap, it is forced to rise over the sill beneath it, thus preventing portions of the upper layer being drawn out with it. Both cap and sill are adjustable. The upper layer discharges at the same time over the cap to second sieve, on which the same thing is repeated, or in case of a one-sieved jig it discharges at once into its appropriate box. The second method is shown in side elevation on the first sieve of Fig. 32, marked *d*. It is Wimmer's once favorite invention of central discharge, of which now very few instances remain in Clausthal. It consists of a discharge pipe

projecting slightly above the centre of the sieve, and surrounded by an adjustable sleeve or cylinder of sheet iron. The lower layer on sieve discharges continuously under the sleeve and over the edge of the pipe, by which it is carried to its bin outside of the jig. Its action is similar to the preceding, which indeed takes its rise from it. The third method of discharge is common to all the sand jigs, and is shown equally well by Figs. 26, 35 or 42. In these jigs the discharge is through the sieve, which consists of a mesh covered by a bed of somewhat coarser pure mineral. The heavier particles of the sands jig through the interstices of the ore layer, and through the mesh, and arrive in the hutch from which they are drawn at intervals as indicated. The upper layers go over a simple sill to a second bedded sieve as in Figs. 35 and 41, on which the same action is repeated, or at once discharged as in Fig. 25 over a sill. (3) What has already been said will indicate the fourth general difference in the jigs to be a difference in methods of jigging. The first method is jigging on the sieve for coarse and fine jigging, and the second method is jigging *through* the sieve for sand jigging. These two methods necessitate the different methods of discharge, which have been shown. (4) The manner of feeding the coarse and fine jigs is by a hopper as shown in Figs. 23, 32, 35 and 42, but the sand jigs are fed through a launder as shown in *a* Fig. 25, through which the sands are drawn, mixed with water, from the zinc funnels or classifying boxes directly on to the sieve.

The general arrangement of the coarse jigs is shown in Figs. 22, 23, 24, which illustrates the construction of a two-sieved coarse jig. Each compartment of the jig is divided at the top into two parts by a partition not extending to the bottom. In the front division is the stationary sieve, and in the rear one the piston.

To change the direction of the current given to the water by the down stroke of the piston with least loss of effect, the bottom of each jigging compartment or the hutch is made V shaped by boards inserted at the proper angle. This serves also to collect the fine particles which are produced by attrition and fall through the sieve during the jigging. This fine stuff, commonly called the hutchwork, is always produced, and is discharged periodically through a hole in the bottom of the hutch by raising an iron rod which has a conical plug fitting the discharge opening. The rod goes through the short division wall between the piston and the sieve in the upper part of the jig box and is provided with a handle. The different jigging compartments in same machine communicate only at the top above the sieves. The sized ore arriving on the sieve through the slit *a* of the hopper is jigged; the concentrated lower layer goes off under the cap *b* into the small launder *c* which discharges it at *d*, into the collecting box *m* at the side. The upper layers passing over the cap arrive on the second sieve which is slightly lower than the first. They are jigged on this sieve, and the heavier portion, settling in a lower layer, discharges continuously under the cap *e* into the small launder *f*, which conducts it into the receptacle *n* at *g*. The upper layers on the second sieve go off over the cap *e*, and fall through *h* into the launder *i*, which conducts them to the collecting box *o*. In the hutches of the two jigging compartments falls continually fine stuff which is produced by attrition and is discharged periodically. That from the first hutch is discharged into the small launder *e* below it, shown in Figs. 22, 23 and 24, and by it is carried to the collecting box *r* and in the same way that from the second hutch is carried by the launder *e'* into the collecting box *r'*. All three of the receptacles *m*, *n* and *o*, for the reception of material from above the sieve, are provided with sloping bottoms and have on the front side discharging slides. The lower half of the sloping bottom of these receptacles is water tight, but the upper part is composed of a screen of a finer mesh than that of the jigged material, through which the water is continuously drained, flowing off down an inclined partition to a launder, *q*, beneath the jig, which delivers into a launder, *t*, from which it is discharged into the clearing tank *u* beneath the floor. In the same way the overflow of the box *r'* passes by a cut in the top of the partition into the box *r*, from which it flows off through the launder *t* into the clearing tank *u*. The receptacles *m*, *n*, *o*, *r*, *r'*, are sufficiently high to allow of discharge into cars. In the works there are 9 of these two-sieved jigs, and 4 one-sieved jigs, which are used for rejigging middle products. All of them are provided with large hoppers into which the sized ore is dumped from the upper floor.

The fine jigs are of 3 classes, viz.: two sieved jigs with partial central discharge, 12 in number, for stuff between 4·22mm and 2·37mm, which are shown in Figs. 31, 32, 33; two-sieved jigs, jigging stuff between 2·37mm and 1mm, 7 in number, jigging through the sieve, which are not illustrated; and four-sieved blende jigs, Figs. 41, 42, 43, which jig blendy stuff of 2·37mm to 1mm through the sieve into the hutch. In the two-sieved jigs with partial central discharge, Figs. 31, 32, 33, the concentration on the first sieve discharges under a sleeve in the centre into a pipe which carries it into the receptacle *c*. The upper layers pass over a sill to the second sieve, from which the concentration is discharged under the cap *f* into the receptacle *m*, and the remainder passes over the cap into the receptacle *l*. The hutch work goes by launders below into the box *n*. In this case the water drains from *c* and *m*, as before, by means of screens and launders into the clearing tank, but the overflow from *l*, passes by a screen into *n'*, from which the overflow discharges by two launders into the clearing tank. These jigs are evidently old dispositions, and not nearly as well arranged as the more recent ones of which Figs. 22, 23, 24 are a type.

The four-sieved blende jigs were put in as an experiment, and they are certainly a departure from the usual Hartz practice. There is no reason, however, why they should not do well, for although a four-sieved jig is a novelty in the Hartz, four-sieved jigs have long been used successfully at Silberau, near Ems, and at Breinigerberg, near Stollberg. At Dieppenlinchen, near Stollberg, five-sieved jigs have even given satisfaction for sands, and the blende stuff jigged on the four-sieved jigs at Clausthal would fairly fall under the head of sands according to the old classification. These four-sieved blende jigs are represented by Figs. 41, 42, 43, and treat blendy stuff between 2·37mm and 1mm, jigging through a sieve bed. The pure schlich from the first hutch goes by a launder into the box *b*; the middling from the second hutch goes to the box *c*; the pure blende from the third hutch discharges into *d*; the middling from the fourth hutch discharges into *e*, and the clear rock from above the four-inch sieve discharges into the box *f*. The overflow from *b*, *c*, *d* passes into *g*, from which it is led by two launders to the clearing tank, while that from *e* and *f* is drained off by screens and goes by two launders to the same place.

The last class of jigs are the *sand jigs* proper, for stuff under 1mm, all of which jig through a sieve bed. They are of one, two and three sieves, respectively, of which only the one-sieved machine is illustrated in Figs. 25, 26, 27, which needs but little explanation. The hutch work goes off into *c*, from which the overflow goes into the second box *c* and then into settling boxes *d d* and *c*. The water and lighter stuff goes off over *e* into the pipe *f*. The various data concerning these jigs have been collected by me into the following table for purposes of reference:

TABLE OF JIGS AT CLAUSTHAL.

	Coarse Jigs.		Fine Jigs.			Sand Jigs.					
						Fine Separation House.	Middle and fine Crushing House.	Stamp House.		Aux. Washing House.	
Number	9	4	12	7	5	2	6	8	8	6	6
Number of sieves	2	1	2	2	4	1	1	3	2	3	2
Number of pistons	2	1	2	2	4	1	1	3	2	3	2
Length of stroke	38 mm	25 mm	18 mm	12 mm	16 mm	12 mm	12 mm	12 mm	12 mm	12 mm	12 mm
No. of strokes per min.	100–120	100–120	120	125	125	120–130	120–130	120–130	120–130	120–130	120–130
Method of jigging	Continuous on sieve.	Continuous on sieve.	Continuous on sieve.	Continuous through sieve	Continuous through sieve	Continuous through sieve	Continuous through sieve	Continuous through sieve	Continuous through sieve	Continuous through sieve	Continuous through sieve
Method of discharge from 1st sieve	Under and over cap.	Under and over cap.	Centre and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.
Discharge from 2d sieve	Under and over cap.	.....	Under and over cap.	Through sieve and over sill.	Through sieve and over sill.	.....	.....	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.	Through sieve and over sill.
Discharge from 3d sieve	.....	.....	.....	.....	Through sieve and over sill.	.....	.....	Through sieve and over sill.	.....	Through sieve and over sill.	.....
Discharge from 4th sieve	.....	.....	.....	.....	Through sieve and over sill.	.....	.....	.....	.....	.....	.....
Product of 1st sieve	Galena & Hutchw'k.	Galena, Hutchw'k & Rock.	Galena & Hutchw'k.	Rich Hutchw'k Galena.	Rich Hutchw'k Galena.	Galena & rock.	Galena & rock.	Galena.	Galena.	Galena.	Galena.
Product of 2d sieve	Enriched stuff, Hutchw'k and Rock.	.....	Galena & Blende, Rock.	Galena & Blende, Rock.	Galena & Blende.	.....	.....	Enriched sands.	Enriched sands.	Enriched sands.	Enriched sands.
Product of 3d sieve	.....	.....	.....	.....	Blende.	.....	.....	Poor sands.	.....	Poor sands.	.....
Product of 4th sieve	.....	.....	.....	.....	Blendy Rock.	.....	.....	.....	.....	.....	.....
Size of sieves	·7 × ·5 m	·7 × ·5 m	·4 × ·9 m	·4 × ·9 m	·4 × ·6 m	·7 × ·5 m	·7 × ·5 m	·7 × ·5 m	·7 × ·5 m	·7 × ·5 m	·7 × ·5 m
Size of jig	1·7 × 1·2 × 1·2 m high.	1 × 1·2 × 1·2 m high.	1 × 2 × 1 m high.	1 × 2 × ·8 m high.	3 × 1 × 1 m high.	1 × 1 × 1 m	1 × 1 × 1	2·5 × 1 × 1 m high.	1·7 × 1 × 1	2·5 × 1 × 1 m	1·7 × 1 × 1
Size of stuff worked	17·78 to 4·22 mm	Middle product from coarse jig.	4·22 to 2·37 mm	2·37 to 1 mm	Blende 2·37 to 1 mm	Under 1 mm	Under 1 mm	Classified stuff under 1 mm	Rejigging under 1 mm	Classified stuff under 1 mm	Rejigging under 1 mm.
Size of sieve holes	2 mm	2 mm	1·5 mm	1 mm	1 mm	·75–1 mm	·75–1 mm	·75–1 mm	·75–1 mm	·75–1 mm	·75–1 mm

Fig.22

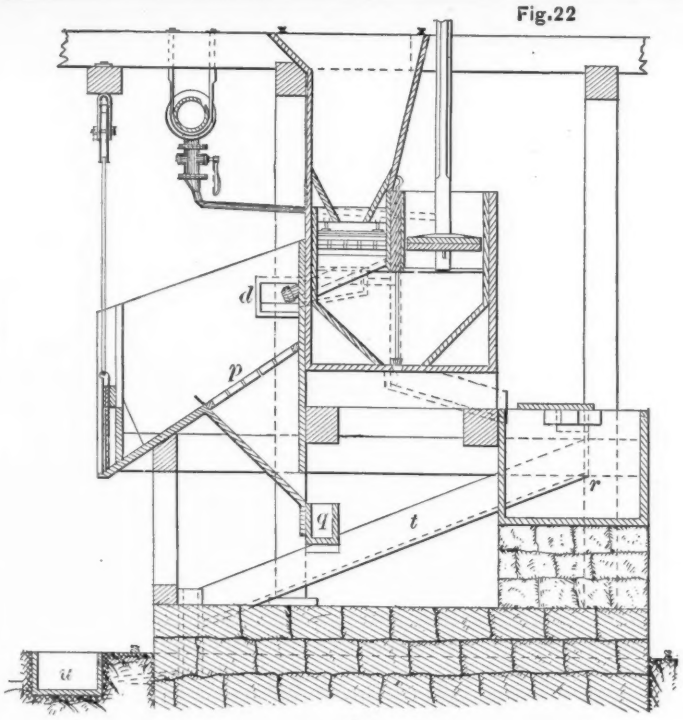
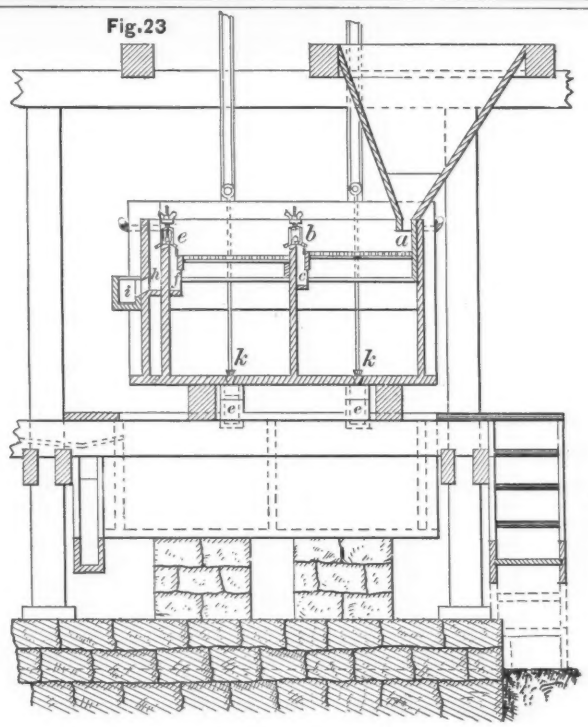
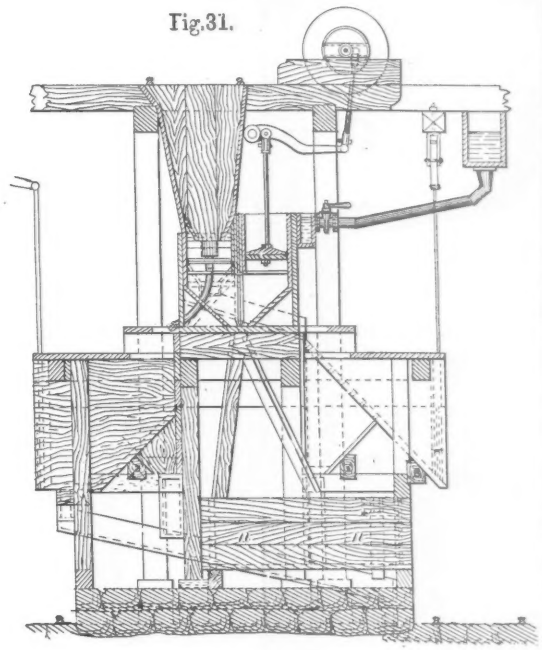


Fig.23



Section of Fig. 22.

Fig.31.



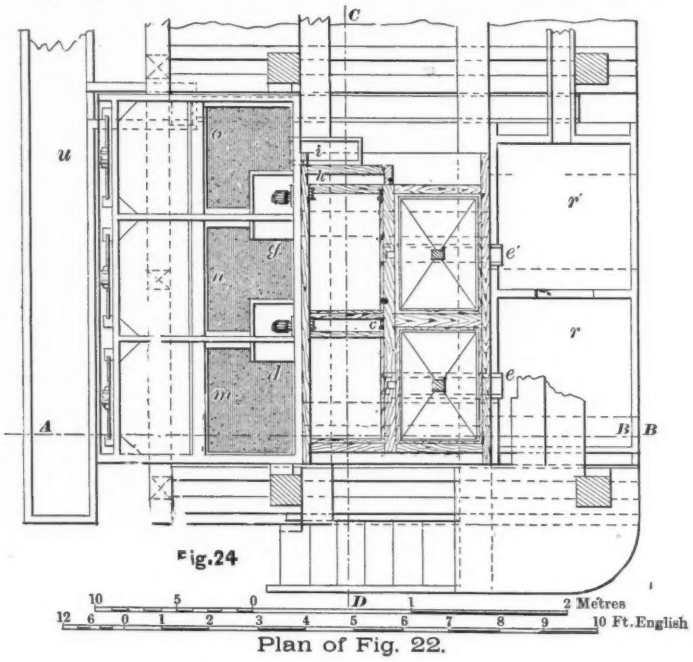
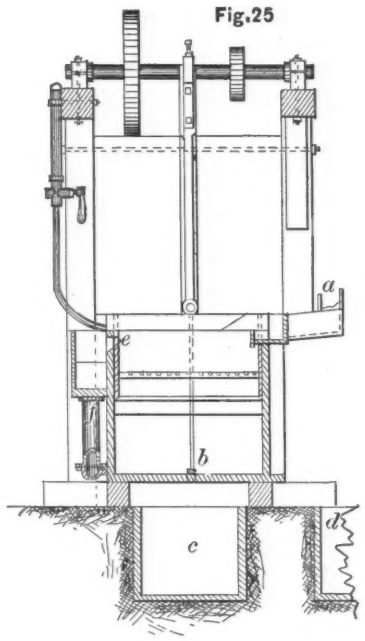


Fig.24

Plan of Fig. 22.

Fig.25



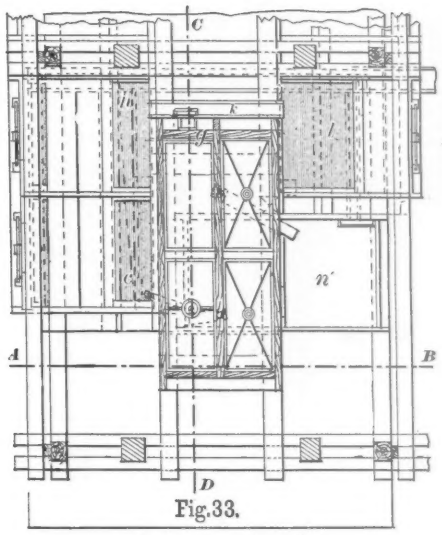


Fig.33.

Plan of Fig. 31.

THE JIGS—REGISTER.

Figs. 22, 23, 24—Coarse Jigs for Stuff between 17.78mm and 4.22mm.

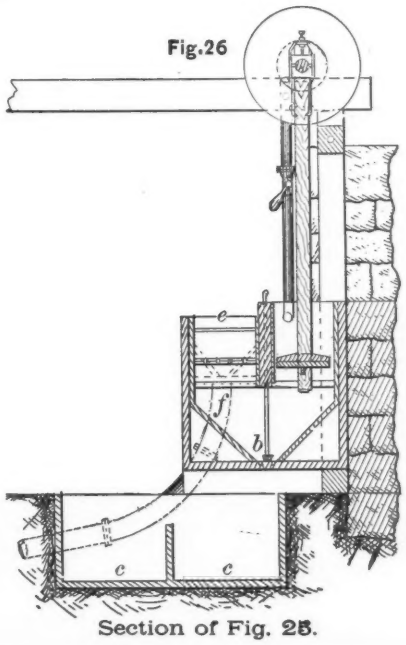
Figs. 25, 26, 27—Single Sieved Sand Jigs for Stuff under 1mm.

Figs. 31, 32, 33—Fine Jigs for Stuff between 4.22mm and 2.37mm.

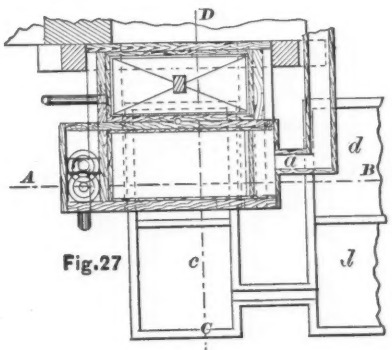
Figs. 34, 35, 36—Sand Jigs for Stuff between 2.37mm and 1mm.

Figs. 41, 42, 43—Four Sieved Blende Jigs.

Fig.26

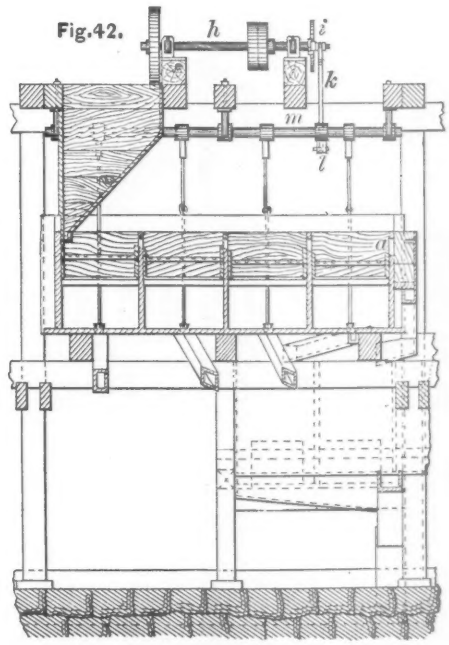


Section of Fig. 25.



Plan of Fig. 25.

Fig.42.



Section of Fig. 41.

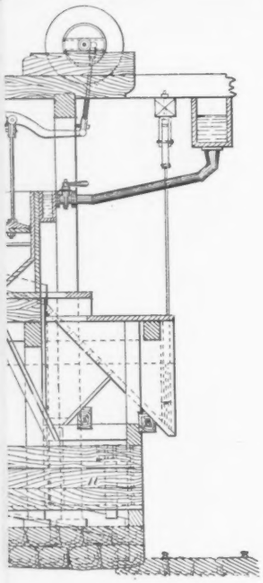
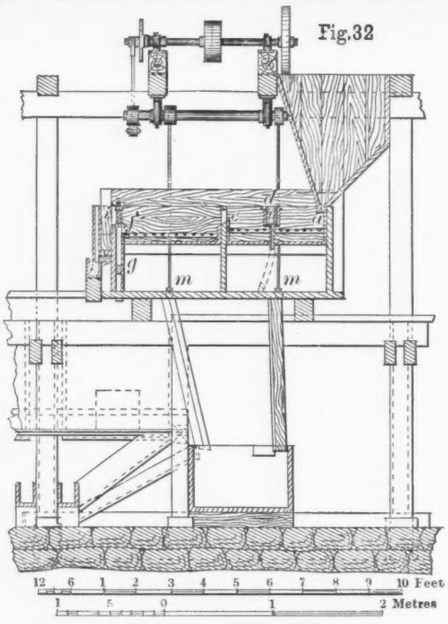
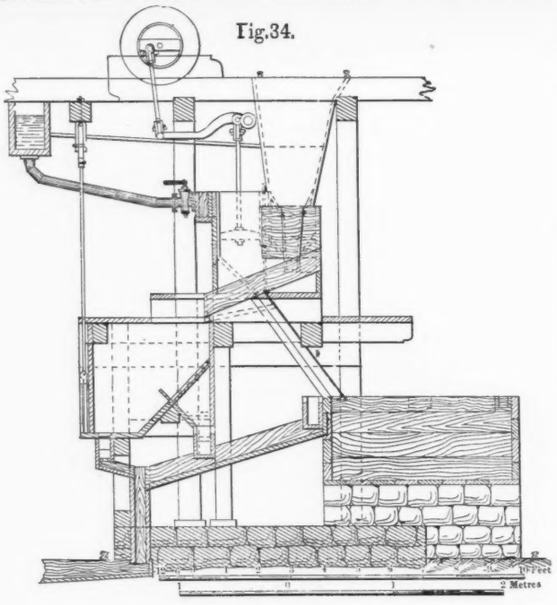


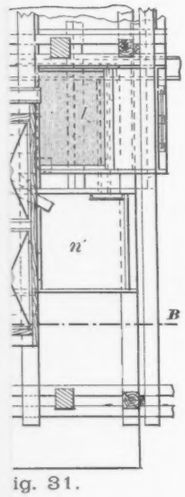
Fig.32



Section of Fig. 31.

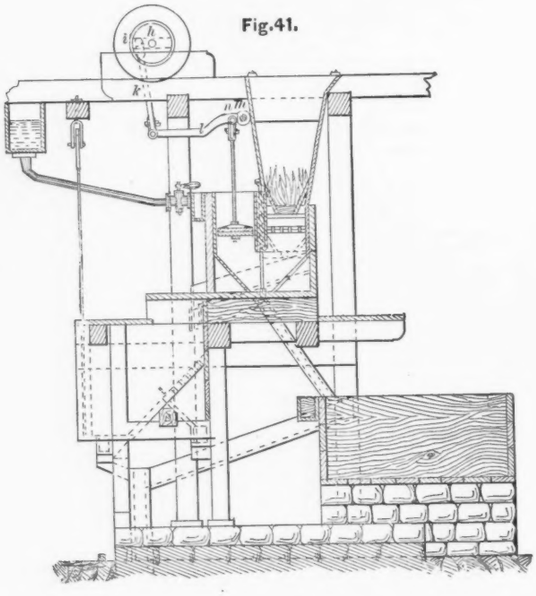
Fig.34.

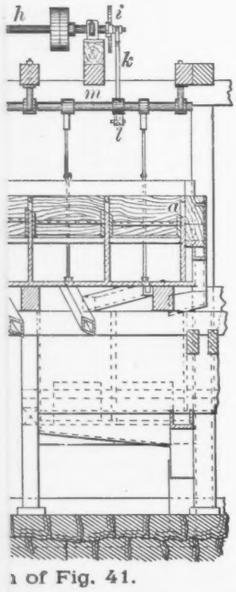




ig. 31.

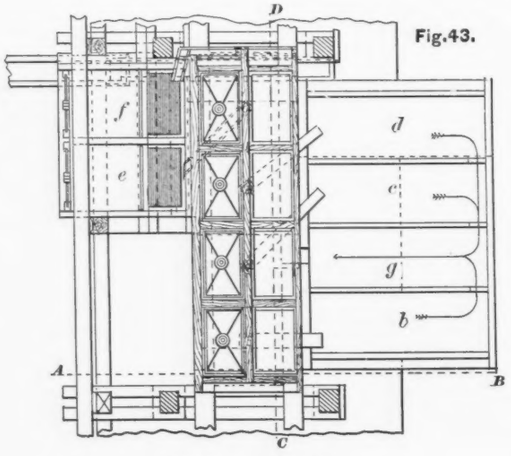
Fig.41.





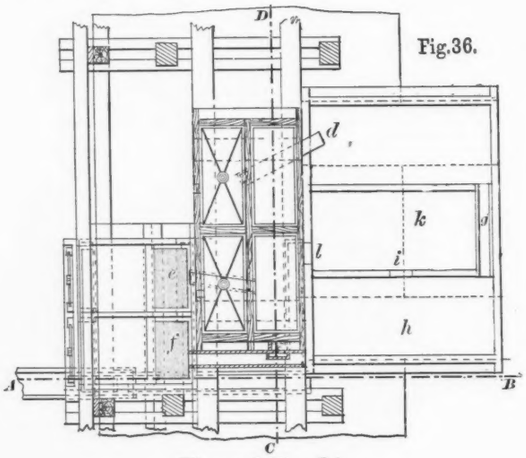
of Fig. 41.

Fig.43.



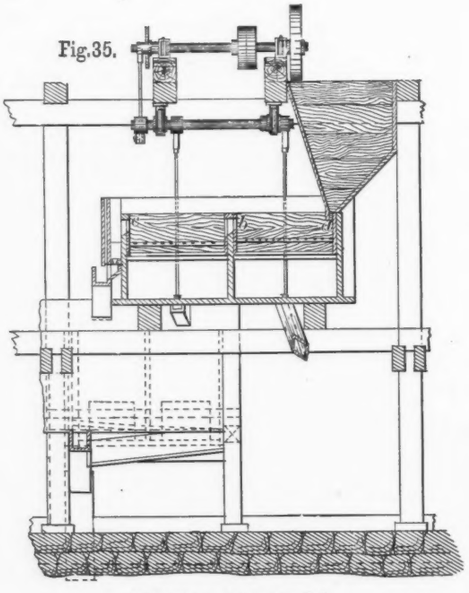
Plan of Fig. 41.

Fig.36.



Plan of Fig. 34.

Fig.35.



Section of Fig. 34.

It will be noticed that in jigging none of the jigs are given more than 130 strokes a minute. In Siegen and other localities as many as 300 strokes per minute have been used in sand jigging with reported good results. It is proposed to double the number of sand gigs in the stamping-house and auxiliary washing house. As has been remarked the whole system might be changed in these two houses with good results.

IV. It now remains only to speak of the buddles and tables. All the buddles in the stamp house are convex buddles arranged in pairs, an upper and a lower one overlapping, and on separate shafts. The upper one is 3^m in diameter. and the lower one $4\frac{1}{2}^m$ in diameter. The middling from No. 1 or the upper one is retreated on No. 2, the lower one. In the auxiliary washing house the buddles are arranged in triplets by placing a concave buddle above the upper convex one on the same axis. The lower one is convex as in the stamp house. The dimensions are the same. This arrangement gives great satisfaction on account of its finer work, and it is probable the buddles in the stamp house will be altered in the same way. There are four sets of double buddles in the stamp house and three sets of triple ones in the auxiliary washing house. The tables are of the non-continuous Planherd pattern (spoken of in last number as "continuous," by a typographical error), of which no details are at hand. Experiments have recently been made with Rittinger's shaking tables, but no result has been reported. The introduction of a large number of Rittinger tables, with glass beds, would seem very desirable. By their use such extensive sand jigging would no longer be necessary.

In the stamp house and auxiliary washing house the labyrinths are used for settling the slimes from the turbid water of the sand jigs. They are of the usual Hartz type, and consist of series of long deep boxes built side by side, and communicating at each end by cuts in the side wall. There are 8 of them in the stamp house of 11 boxes each, and 6 of them in the auxiliary washing house of 12 boxes each. The circulation in each set is $25-30^m$ in length.

(TO BE CONTINUED).

MINING IN GREAT BRITAIN.

Correspondence to the Engineering and Mining Journal.

LONDON, February 1, 1878.

The mining industry, which for a long time past has been in a very depressed state, shows yet no signs of revival in any direction. Among the tin miners of Cornwall, want is making itself grievously felt. A large proportion of the mining population lack employment, and even those who are fortunate enough to retain their places in the mines are able to earn but a bare pittance by long hours of toil. Many are leaving the country, some for Australia, but the larger number for the Pacific coast. This movement will tend to alter the existing state of things, both in the duchy and in the mining districts of the Western States of America, though the influence of such a movement cannot be great. At home, but little improvement is to be expected to result from this exodus. It is not by reducing the number of those who are dependent for their living upon tin mining that prosperity is to be restored to Cornwall; the chief cause of the painful state of things which has there come about is, not the general depression of trade, but the competition from Australia. The rich and extensive deposits of tin lately discovered have enabled the miners of that colony to offer the metal in the English market at a price that barely covers the cost of production in Cornwall; and, as the fields are further developed by the enterprise of capitalists who are being attracted to them, and by the labor of those Cornishmen who are driven thither by want, the difference between the market price of the article and the cost of home production is likely to become still more unfavorable to the latter. Hence, it is rather to labor-saving machinery, and to improved systems of mining that we must look for an amelioration of the present unsatisfactory state of things. But here the strong prejudices of the Cornishman come in the way of his welfare. Numerous have been the attempts to introduce such machinery into the Cornish mines, and as numerous have been the failures. The very efficient appliances that have for years been in use on the Pacific coast, whither Cornishmen have mostly emigrated, have been viewed with disfavor because they were "outlandish." And even machine rock drills and the strong explosives, though pushed in the country with great pertinacity, have until quite recently been regarded as impracticable or useless inventions. Of late, however, a change has become apparent in the feelings of mine owners, though it does not seem to have yet extended far beyond them. In several instances, improved machines have been adopted. Collom's jigger, so well known on your side of the Atlantic, and found at one mine only in England, is now favorably spoken of. Other machines are being tried, and power rock drilling is now being carried on in a systematic manner in one place under the direction of an influential committee. If this change of feeling continue, the country may yet be saved from that total extinction as a tin-producing district with which it is now threatened. The Cornish miners should bear in mind that, although the Australian tin is weighted with the freight of a voyage half round the world, it is produced, as stream tin, at a very low cost, and that the tin of Cornwall has to be extracted from great depths, and prepared by costly processes.

In South Wales, among the coal and the ironstone miners, the distress is even greater than in Cornwall. In this case, however, the depression is due to the stagnation in trade, which has now for so long a period existed, and may, therefore, be expected to pass away when the anxiously-looked-for reaction comes. Many of the miners are emigrating to the north of the principality, where they readily obtain employment in the slate quarries. Happily this branch of the mining industry remains in a fairly prosperous state, though it is becoming apparent that this state cannot long continue unless trade generally revives. To hasten the advent of the evil time, extensive strikes have occurred in the building trades, and the market for slate is already suffering in consequence. It seems that the working man, in this country at least, in matters affecting his own welfare, is incapable of learning anything or of forgetting anything.

In the other mining districts, and notably in those which a few years ago were the most prosperous, namely, the ironstone districts, the same depression prevails. A large number of the blast furnaces are out and the number is weekly increasing. The demand for coal is consequently anything but brisk. Notices of a reduction in the rate of wages are accepted and speedily followed by other notices of the same character. These successive reductions have brought down the rate to what it was before the absurdly large advances were forced upon the masters during the short period of inflated prices a few years back. But it is hard to see how the fall is to stop here. The reductions are sometimes resisted, and a strike ensues. The result is, however, always that which follows upon a struggle with the inevitable.

The existing state of things is thus obviously unfavorable to the introduction of new machines and processes; and there is, consequently, but little in the way of novelties to record. There are some new machines and novel combinations likely to prove successful that are now being withheld till better times bring more favorable opportunities. Some of these may be exhibited at Paris during the coming summer. The Exhibition is likely this year to prove more than usually attractive to mining men, who, by the exigencies of the times, are compelled to seek there the improved means which, on account of unpropitious conditions, are not otherwise brought to their notice.

A step in the right direction has been taken by some persons here interested in machine rock-boring. It should be clear, on reflection, to every one, that the full advantage of machine labor in boring can be had only by following a definite and suitable system, and by properly organizing the forces at our disposal. An effective and a complete organization is, indeed, essential to success in machine boring, and the degree of success attained will be strictly commensurate with the degree of effectiveness and completeness of the organization adopted. A small company is to be formed to undertake by contract the driving of headings and the sinking of shafts through hard rock. It is proposed to employ only well-trained men, and to select the *personnel* of the company so as to bring together the greatest amount of theoretical and of practical knowledge, and of skill in the management of men and in the conduct of operations. One of the best drills will be used, and the most efficient system of working will be followed. The explosive agent employed will be dynamite. Firing will be effected by means of electricity, and measures will be taken to blast out the whole face of work at once. In this way it is hoped to attain a rate of progress considerably higher than any hitherto reached. Certain it is, that if these proposals are properly carried out, the highest attainable rate will be gained. In view of the unsuitable and slovenly manner in which machine boring is now often carried on, this proposal to bring something like system into the operations is to be hailed with joy. The progress of this band of skilled workers will be watched with interest by all mining men.

The late disastrous explosion of fire-damp in Scotland has again directed public attention to the practice of shot-firing in gassy mines. All the explosions of the last two years have, by some persons, been attributed to this cause, though it must be confessed that in the greater number of these cases the evidence in favor of that view has been very weak. The assumption is regarded by many practical men as altogether unwarrantable; and hence every such accident leads to warm, and not unfrequently acrimonious, discussions, ending often in an appeal on the one part to governmental authority to prohibit the practice, and to a protest on the other part against any such interference. It is a suggestive fact that the cry now throughout England is for remedial legislation. Time was when Englishmen strongly resented all unnecessary restrictions upon their liberty of action, and they set themselves determinedly to work to rectify with their own hands whatever appeared to them to be wrong. The ability to regulate his own affairs, and the liberty to avail himself of the power to do so, was formerly an Englishman's boast, and it was certainly no mean boast. Now, however, he appeals to his government to prevent him from doing himself an injury. He no longer thinks of putting his shoulder to the wheel when fixed in the mire of some difficulty, but, instead, exhausts his energies in lamentations and in prayers to the Jupiter of Parliament to come and aid him. One would have thought that the restrictions placed on mining by recent legislation were sufficient to satisfy the desires of the most helpless of mortals. If shot-firing be found to be dangerous in some mines, why cannot those in charge prohibit the practice there? Can it be necessary to impose a law to this effect, which shall hamper the action of men other-placed, and, while extending yet further the authority of the inspector, fix one more clog upon mining enterprise?

The growing feeling against shot-firing in coal mines has induced inventors to come forward with a substitute for blasting. At the present time, two new, or partially new, breaking down machines are being practically tested. Both of these are said to work very effectively, and to satisfy the requirements imposed by the conditions under which they have to operate.

MINING NEWS.

ARIZONA.

Review of the Arizona Mining Industry for 1877.

We take the following from the Prescott *Enterprise* of the 6th inst.:

"Notwithstanding the severe drought of the past season, the year 1877 has been the most prosperous in the history of Arizona since its settlement by whites; more capital has been invested; a greater amount of the precious metals have been produced, and more life and activity displayed in prospecting and development, than ever before known."

MOHAVE COUNTY.—Our northern neighbor has well maintained her reputation as a steady bullion producer during the past year. Great activity has been displayed in the different districts; work has been carried on steadily on many rich and promising mines, and several valuable discoveries have been made. In the northern portion of the county the Hackberry Mining Company—which had the misfortune to have its mill burned last summer—have their new mill nearly completed and will soon resume their regular bullion shipments. The five-stamp custom mill at Mineral Park is doing well and turning out a great deal of bullion. The southern portion of the county, however, presents the most cheering outlook. Two companies are now operating on the famous McCrackin, and with the most gratifying results. All is life and excitement in that region and the future prospects are most encouraging. Mohave County has, at present, 45 stamps in operation and 20 more (Hackberry and Dean), will soon be pounding. As nearly as your correspondent can learn, the yield of bullion for 1877 amounted to $600,000. With increased reduction facilities Mohave can easily treble this yield the coming season.

YAVAPAI COUNTY.—The banner mining county of the Territory has given a good account of herself during the past year and promises that she will distance all competitors in 1878. From every district in the county is heard the most cheering reports. Our mines have received much attention during the past year from outside parties, and some of them have shown faith in their richness and permanency by investing their money in them. Among those mines which are now being worked by outside capital may be mentioned the California and Tiger in Bradshaw District, which are being thoroughly prospected. In Humbug District the Tip-top Company are opening their many valuable claims, and in a short time will have their 10-stamp mill in operation. In the Peck District the outlook is most encouraging; the new mill is running, and will soon be sending out a steady stream of bullion. Turkey Creek has a two-stamp prospecting mill which has already turned out some bullion. The ores of this district are very rich, but are

somewhat refractory, and require experienced hands to manipulate them. Yavapai County has now 47 stamps ready for work, and will soon have 10 more (the Tip-top mill). As near as your correspondent can learn, the bullion product for 1877 will amount to $700,000.

PINAL COUNTY.—The extraordinary rich ore found in this county has drawn thither a host of mining men from all over the coast, and a great many companies have been incorporated and several important sales have been consummated. The Silver King, McMillan, Stonewall and many other valuable claims continue to yield large quantities of high-grade ore. Pinal has done well in 1877, and promises to do better in 1878. There are in operation some 40 stamps, which will probably be doubled during the present year. As near as your correspondent can ascertain, the bullion product of this county for the year 1877 will foot up to $700,000.

MARICOPA COUNTY.—This county has been considered mainly an agricultural region, but late discoveries show that it is also rich in mineral wealth. By the cutting off of Wickenburg and the adjacent country, from Yavapai, Maricopa gained the famous Vulture Mine. Smith's claim on this mine has been worked steadily during the past year, and has turned out a great deal of money. The Cave Creek mines have also added their quota. These mines have been sold to a San Francisco company, who intend at once to erect a 10-stamp mill. The number of stamps in Maricopa County is 50 (this includes the 45-stamp Vulture mill). The amount of bullion produced during 1877 will foot up to $200,000.

PIMA COUNTY, the oldest mining county of the Territory, is alive to the new departure in the mining history of Arizona, and an awakening to the great mineral wealth of the county is observed on all sides. The attention of outside capital has been drawn to the buried treasures of the Aztec district, and they have shown that they mean business by putting their money where it will do the most good. Much activity has been shown in the various districts of the county during the year just closed, and the yield from those mines which have worked has been most flattering. Pima should be second to none in the yield of bullion, and with additional reduction facilities, she promises, during the present year, to treble the yield of '77. The number of stamps at work in Pima County is 30. The yield of bullion last year will amount to $250,000.

YUMA COUNTY.—The completion of the railroad to this point has given an impetus to every branch of industry. Some very rich gold mines have been discovered in the Cargo Muchacho. The placer mines on the Gila still continue to produce well. The mines of Castle Dome, which have been profitably worked for years, still continue to produce their regular quantity of bullion. The Morena Mining Company, which is operating in the northern part of this county, is about to erect a five-stamp mill on its property, which is looking extremely well. The yield of bullion from Yuma County during the past year will reach $200,000.

Number of stamps in operation and nearing completion in the Territory:

Mohave County	65	Maricopa	50
Yavapai	57	Pima	30
Pinal	40		
Total			242

Besides stamp mills, there are a number of furnaces in operation in the different counties. Among the largest are the Castle Dome Company's works, in Yuma, and the Longfellow Copper Mining Company's furnaces, in Yavapai. There are also hundreds of arrastras scattered over the Territory, working on gold quartz.

BULLION YIELD OF 1877.

Mohave	$800,000	Maricopa	$200,000
Yavapai (including production of Longfellow Copper Mine)	900,000	Pima	250,000
Pinal	700,000	Yuma	200,000
Total			$2,850,000

This is certainly a good showing, considering the facilities at hand. With additional reduction works, it is safe to predict that this yield will be trebled during the coming year, placing Arizona third on the list of bullion producers.

CALIFORNIA.

THE GUADALUPE (CALIFORNIA) QUICKSILVER MINE.—The San Jose *Mercury* says of the recent developments and discoveries in this mine:

"About six months ago, learning that under the management of Superintendent Taylor, new and rich discoveries of cinnabar had been made at the Guadalupe Mine, in this county, and that important improvements had been instituted in the methods of working the mine and reducing the ores, the writer visited the mine at that time and wrote up an account of his observations. Then the new hoisting works had but recently been completed at a cost of over $150,000. The old incline having been abandoned, the new main shaft was down 600 feet; tunnels leading several hundred feet into the mountain, and uncovering a vast body of ore, had been constructed and safely timbered; additional furnaces and condensers had been built; a new water-tight channel had been made for the creek, to prevent flooding the mine; a number of new cottages for the workmen had been erected; the Superintendent's quarters had been substantially improved and the grounds neatly decorated, etc., all of which facts we noted at the time.

"Since then work has been steadily progressing, and Monday last we visited the mine again, for the purpose of further posting the *Mercury's* readers in the matter. We were extended every facility to examine the mine, and improved it to the best advantage. The main shaft has been sunk to the depth of 700 feet, and a new drift has been made at that level to the main ore body, which is found at this depth to drop nearly vertically into the earth. The ledge has been cut across, and is found to be about sixty feet in width, and considerably richer in minerals than at the upper levels. The rock is everywhere streaked and seamed with cinnabar, broad patches of which, several feet in width, occurring here and there, that will yield from 30 to 50 per cent. of metal. It is certainly a remarkable body of ore, how extensive, of course, no one can know, but enough is uncovered in one of the various levels to insure a supply of ore for the furnaces for many years to come.

"A new furnace and condensers of large capacity, and constructed on the most approved plan, have just been completed, and will be ready for charging in a few days. This increased reducing capacity will all be required to meet the increased product of the mine. In fact, with quicksilver at present prices—only about forty cents a pound—there is but little object in crowding the work; but with the least incentive, the mine could readily be made to yield from a thousand to fifteen hundred flasks a month, instead of from six to eight hundred as at present.

"Not the least among the improvements made since our former visit is the construction of a 'bob' at the 500-foot station. This is an immense oscillating arrangement, weighted at one end with a dozen or more tons of pig iron, and is used to relieve and over-balance the heavy strain upon the engine in working the pumps. In all deep mines contrivances of this kind become necessary at about every five hundred feet of depth. The expense of such a work can only be understood by the practical miner: or, perhaps, we should say, rather by those who pay the bills. First an immense chamber has to be excavated and firmly timbered in the rock; and then the heavy machinery is lowered through those awful depths and put together by candle-light, and all under disadvantages that the mechanic of the outer world can but faintly realize. In fact it is difficult for any one who has never visited the lower regions of our great mines, like the New Almaden; Guadalupe, and hundreds of others on this coast, to realize the amount of labor and expense required to penetrate the earth's crust, and bring its hidden treasures to tight."

COLORADO.

THE GOLDEN COAL MINES.—The *Transcript*, of the 13th inst., says of these mines: "We found time yesterday to make the rounds of the coal mines of Golden. At the Colorado Limited Company's mines, on the north side, the miners have drifted to the vein at the depth of 260 feet from the surface, and now have a splendid vein of coal, 10 feet 4 inches wide, and 10 feet from it another of 4 feet 6 inches. They have already commenced hoisting coal, having sold the first load yesterday. Their new pump is in place, and doing excellent work. As we described last week, the top works at this mine are in first-rate condition to dispose of the output rapidly.

"At Hall & Jones' mine we found coal being hoisted rapidly, the underground workings improving with every ton removed. They are now loading five cars per day for the railroad company, besides supplying a large local demand. The pump has arrived, and will be lowered to its place in a day or two. The air-shaft that is being sunk over the vein is now within hearing distance of the miners below, and should open the mine to day-light in a day or two. The mine is in excellent condition.

"Nichols' mines, still further south, are being worked steadily, and are yielding a gratifying output.

"In Evan Jones' mine, north of the town, coal has been struck, so that we may expect a good supply from this new source by the time track is laid on the cut-off."

IDAHO.

The *Silver City Avalanche*, of the 9th inst., says of the mines in that district:

"The Golden Chariot is looking well, and the prospects are much more encouraging at the fifteenth than they were on the thirteenth level. Operations are being judiciously carried forward, and enough wood and other supplies remain on hand to keep the mine running until midsummer. There is every indication that a bonanza is looming up in the lower levels.

"At the Potosi work is being prosecuted under very favorable auspices, and a considerable quantity of rich rock is being turned out daily.

"Rumors prevail again of a rich strike in the Belle Peck.

"The accounts from the Black Jack Mine continue to be very encouraging. The ledge is improving all the time, and the great bulk of the rock taken out, without being assorted, will average somewhere in the vicinity of $30 to the ton. It is unquestionably an immense prospect, and we believe it has never been surpassed in this section of the country.

"The ledge worked by St. Clair & Newcomb is looking better than ever, and the boys will certainly gobble up a few thousand dollars the coming season.

"The Jones mill, near Wagontown, is running on Lepley rock. The last crushing from the Webfoot turned out quite well.

"M. Hyde, Esq., writes us from Baker City, under date of January 31: 'The Virtue mine will start up in full blast as soon as the Cornish pump, now being built in San Francisco, arrives here. I just cleaned up $9,000, the result of twelve days run, on rock taken out by men working on tribute. I have recently purchased what is known as the Green discovery mine and mill at Rye Valley for the sum of $14,000. This is a good property, and everything will be put in running order by the 1st of May.' From information from other sources it looks as though Eastern Oregon had good prospects for the coming season, and that the mining yield will be greatly in excess of what it has been for years past.

"Only a limited force of men is being worked at the Buffalo and Menarch. At the Buffalo there is an abundance of good ore out, and a sufficient quantity on hand at the mill to keep them crushing until July. They are turning out bullion to the amount of about $1,000 per day, with but a few men working. The Baxter mill is running on Leonori rock and doing well."

MONTANA.

The *Butte Miner*, of the 5th inst., says of the *North Star Silver Mine*: "This mine crops out distinctly on the surface, but its croppings not being very rich, the real wealth of the lode was only ascertained when the shaft sunk upon it had reached the depth of 20 feet. At this depth it was found to be four feet wide, inclosed between unbroken and very clearly defined walls, and composed of chloride of silver, assaying about one hundred ounces of silver to the ton. As the shaft was driven deeper the ore continued to improve until the depth of 27 feet was reached, when a vein of very high grade ore was met with, close to the hanging wall. This vein when first struck was only four inches thick, but its thickness has increased to fourteen inches at the bottom of the shaft, which is now 31 feet deep. It is composed of black sulphurets and chloride of silver of a very high grade, some of the specimens taken out being pure silver and sulphur without any admixture of gangue. Two assays made from the chloride, from pieces representing the average as closely as could be judged, gave returns of 193 ounces and 169 ounces of silver to the ton.

"The North Star has every appearance of being a true fissure vein, and experts who have examined it are unanimous in the opinion that for some distance at least below the present depth of the shaft the ore will continue to improve. The shaft will be sunk about twenty feet deeper, when levels will be opened and stoping commenced. The lode runs east and west, parallel to the Rainbow, and dips to the north at an angle of about 45 degrees. A commodious building has been erected at the shaft, and every necessary preparation for the energetic working of the mine will be made by its owners."

THE ALGONQUIN COPPER MINE.—At the present depth, 175 feet, the Algonquin shows a large body of high grade ore, and promises to rank among the most valuable mines of the Territory. The ore body in this mine, like the Trout, Salmon and Murray & Durfee, all of Trout Hill, is accompanied by an immense dyke of manganese, and carries a considerable percentage of galena and lead carbonate, as well as oxide and carbonate of copper. The ore will require roasting with salt.

All these mines, with the ferruginous dykes of manganese, occur in a very ancient metamorphic lime rock, overlaid by the contiguous belt of granite and gneiss, the line of contact running north and south. All the valuable ore bodies, so far discovered, occur in the lime and near its line of contact with the granite and gneiss. All of these veins, except the Salmon, run almost due east and west, but the Salmon runs north and south and cuts the others at right angles. These veins are all vertical and cut the country rock, which has a north and south strike and dip to the east, showing, what is not very common in lime, evidence of prime veins.

Both mills are running regularly, making large returns, with splendid prospects ahead.

PROSPECTS OF MONTANA COPPER SHIPMENTS FOR 1878.—A very large amount of argentiferous copper ore was last season shipped east from Butte, and a still larger amount, some assert, will be shipped during the season now approaching. But in this we believe they are mistaken, as we think that very little ore will hereafter be sent east from this portion of Montana. Upon the completion of the reverberatory furnace, now in course of construction at Glendale, the Hecla Company will pay a higher percentage of the assay value of all kinds of Butte ores than can possibly be received for them, after deducting the cost of their shipment east. With the opening of the freighting season, there will come such a demand from Glendale for ore as will convince our miners that their recent contributions to the road fund was their best investment of the year.

THE HECLA REDUCTION WORKS.—The cupel furnace at the Hecla Reduction Works, Glendale, has been erected and the first run already made. Although it does its work very well (the bullion refined at the first trial being 997 fine) the furnace is found to be much too small to satisfy the demands that will be made upon it. Only about a ton and a quarter of base bullion can be treated in twenty-four hours, whereas the average yield from the large smelter alone is at least twelve tons of base bullion in the same length of time. It is said that the Hecla Company will largely increase their cupelling facilities during the coming summer.

RICH ORE DISCOVERED NEAR HELENA.—We take the following dispatch dated Helena, M. T., Feb. 15, from the Chicago *Inter-Ocean:* "A rich strike has recently been made in the Snowdrift mine, about twenty-two miles northeast of Helena. Fifteen hundred ounces, valued at $24,000, were taken from the mine, and is now on exhibition. The vein is thirteen feet wide. The weather is of the loveliest kind. Not a particle of snow has fallen here this winter.

NOTES.

NO COAL AT LA CHAPELLE.—After boring 328 feet clayey schists were met, and the search for coal was abandoned.

CO-EFFICIENTS OF EFFECT OF HYDRAULIC MACHINES.—Westmacott states this in direct-acting apparatus at 93 per cent.; 2 to 1, 80 per cent.; 4 to 1, 76 per cent.; 8 to 1, 67 per cent; 16 to 1, 50 per cent.

FUEL ON THE GREAT EASTERN.—In the second half of 1877 the expenditure for coal and coke in the "loco." department of the Great Eastern Railway was £55,716. The corresponding outlay in the corresponding period of 1876 was £61,048.

MINERAL TRAFFIC ON THE GREAT EASTERN.—In the second half of 1877, the revenue derived by the Great Eastern Railway Company from mineral traffic was £146,231. The corresponding revenue in the corresponding period of 1876 was £150,506.

ANEROID BAROMETERS—For measuring heights not exceeding one-quarter mile above the sea by means of the aneroid, Admiral Fitzroy proposed the following method: Divide the difference between the reading at the upper and lower stations by 0.011; the quotient is the approximate height in feet.

Messrs. Bolckow, Vaughan & Company, Limited, Middlesbrough, iron and steel manufacturers and colliery and mine owners, are among the largest trading companies of Great Britain. They have a subscribed capital of £3,650,000, employ 12,000 operatives, and pay upwards of £1,000,000 a year in wages.

STEEL AND NAVAL CONSTRUCTION.—The recognition now given to steel for naval construction, both by the British Board of Trade and Lloyd's Registry, will enable it to compete with iron, not only on equal but on better terms, and contracts for the building of both war and merchant vessels are now being executed at several British ports.

INTERCEPTION OF RAINFALL FROM SEWERS.—Latham proposes connecting the rainfall sewers with the sewers proper, and at suitable points putting "interceptors"—leaping weirs so arranged that small and therefore impure rainfalls pass into the sewer proper, while large and purer volumes of rainfall leap these and pass off into the rainfall sewers.

SULPHUR AND PHOSPHOROUS IN IRON are shown by Troost & Hautefeuille not to destroy its metallic luster, although they alter its malleability and ductility. They show that sulphureted iron is, like silicureted iron, formed with scarcely any

evolution of heat, while phosporus and iron combine vigorously with evolution of heat and form more vigorous compounds than do sulphur and iron.

The recent armor-plate experiments at Portsmouth not having led to a satisfactory determination whether steel is superior to iron for the coating of ships of war, a further series is in contemplation by the Admiralty, and already two plates have been received at Portsmouth from Messrs. Brown, of Sheffield. That firm will also send an additional plate, and three plates are likewise being manufactured by Messrs. Cammell, of the Cyclops Works, for the purposes of the experiments.

RECORD OF A KENTUCKY FURNACE. — The following statement gives the details of the operations of the Hunnewell Furnace, located in the Hanging Rock region, for 1877:

Bus. charcoal used	694,843.00	Bus. coal per ton iron made	132.00
Tons ore used	14,312.00	Tons " " " "	2.72
" limestone used	650.00	Tons lime " " " "	.13
" iron made	5,265.00	Daily average	17.44
Days run	302.00		

Herr Scheffler, in *Organ fur die Fortschritte des Eisenbahnwesens*, 1877, Heft v., discusses the influence of speed on the number of railroad accidents. Although he finds four times as many accidents on freight trains as on express trains, and twice as many as on ordinary passenger trains, the slowest trains are not the most dangerous. After making allowance for the distance traveled, the principal kinds of accidents, and other considerations which are requisite for a true basis of comparison, he arrives at the conclusion that the danger of bodily accident increases as the square of the speed; and the danger of injury to the track or rolling stock, as the cube of the speed.

The *Annales des Ponts et Chaussees*, for August and September, 1877, contain two valuable articles on the "Block System" of running trains. From the second article we extract the following statistics: The average loss of life in France, in traveling by diligence, was 1 in 355,000; on railroads, from 1835 to 1855, 1 in 2,000,000; from 1855 to 1875, 1 in 6,000,000; from 1872 to 1875, 1 in 45,000,000. A person traveling constantly by railroad, for ten hours a day, at the rate of 50 kilometres per hour, estimating a mean journey at 30 kilometres, would have had the following chances of being killed by a railroad accident: 1835 to 1855, 1 chance in 321 years; 1855 to 1875, 1 chance in 1,014 years; 1872 to 1875, 1 chance in 7,459 years.

SOUTH AMERICAN RAILWAYS.—Following is the latest railroad news from Colombia, S. A.: Work on the Antioquia Railway is progressing favorably. With 125 men 2,900 feet was laid in August. The contractor now proposes to put 500 men on as soon as he can get them. Mr. Ross has a contract for the construction of the Central Railway, at a cost of $20,000,000. He is to receive a subsidy of $250,000 a year for twenty-two years, and 25 per cent. of the product of the customs. The general direction of the Central Railway will be from a point on the west bank on the Magdalena, below the mouth of the Sogamosa, or in the Cienega de Paturia, and will proceed *via* the Lebrija River to Bucaramanga, and thence through Piedecuesta and Somjil to Bogota, passing as near as possible to the larger towns in the States of Santander, Boyaca and Cundimarca. The contractor will be allowed twelve years to complete the railway, allowance being made for any stoppage of the works for which the contractor is not responsible.

PROGRESS OF THE IRON INDUSTRY IN TEXAS.—The Galveston *News* says: "Marion County, Tex., is becoming the seat of a large and industrious iron mining and manufacturing industry. The iron mines, foundries and mills are alone sufficient to make this a populous and prosperous county. The iron ore is said to be equal in every respect to the celebrated Salisbury iron. The metal is strictly neutral, being neither cold nor red—short, of a very large, coarse grain, of a dark color, and is used at the Kelleyville foundry, without the admixture of any other iron, for the making of stoves and hollow ware. When melted in the cupola it runs almost like water. They make the five qualities of iron here for use in the foundry, but sell most of the No. 1—No. 4 or mottled, mixed with the No. 3 makes the standard and beams for the Kelley plow—and the No. 5 is used for plow points, which outlasts any of the best steel they can get. The soil is very sandy, and this hard metal withstands the scour. The factory made and sold last year over ten thousand, and this year are going to make fifteen thousand. Jefferson, the county seat, a city of some 7,000 inhabitants, is its only important town, and is the junction of the Texas and Pacific, and East Line and Red River (narrow gauge) railroads; also the head of navigation on Cypress bayou, a tributary of Red River, giving it communication by water with New Orleans."

NEW PATENTS.

The following is a list of new inventions relating to Iron, Coal, Mining Machinery, Chemical Apparatus and the Treating of Precious Metals, etc., from the official *U. S. Patent Gazette*, for the week ending January 29, 1878:

No. of Patent.	*Title of Invention.*	*Name of Inventor.*	*Residence.*
199,648	Steam Generators	Thos. L. Jones	Natchez, Miss.
199,654	Compounds for Producing Illumi'g Gas	Louis Marks	San Francisco, Cal.
199,692	Damper Regulators for Steam Boiler Furnaces	Wm. R. Cole	Detroit, Mich.
199,707	Grate Bars for Furnaces	N. Henzel & Co.	Prag, Austria.
199,709	Rotary Steam Engines	John S. Hewitt	Wheatland, Mo.
199,724	Ore Amalgamators	J. B. Le Clere & Co.	San Francisco, Cal.
199,761	Dumping Cars	M. Von Wormer	Dayton, O.
199,873	Turbine Water Wheels	Richard M. Stewart	Americus, Ga.

INDEX OF CURRENT TECHNICAL LITERATURE.

EXCHANGES.

[In this department will be given abstracts of the more important original articles contained in current technical periodicals at home and abroad.]

The following gentlemen have kindly consented to assist in making the reviews of current technical periodicals:

JOHN C. RANDOLPH, Mining Engineer, New York.
Prof. TROWBRIDGE, School of Mines, Columbia College, New York.
Prof. H. S. MONROE, " " " " "
Prof. T. EGLESTON, " " " " "
ARTHUR F. WENDT, Mining Engineer, New York.
MANSFIELD MERRIMAN, Yale Scientific School, New Haven, Conn.
FRANKLIN GUITERMAN, Mining Engineer, Cincinnati, Ohio.
Prof. P. deP. RICKETTS, Ph. D., School of Mines, New York.
Prof. E. A. FUERTES, Cornell University, Ithaca, New York.

REPORTORIUM FUR EXPERIMENTALPHYSIK.—Munchen, No. 6. 1877.—*On the Diffusion of Steam through Porous Plates*, by Dr. J. Puluj. (Experiments on the vapors of cloroform and alcohol are also detailed.)....*On Tschechovitsch's Wave Apparatus.* (A combination of pendulums for illustrating the various kinds of waves, wave interferences, etc.)....*Metrological Studies*, by H. Wild. (On methods of comparing standards of measure and on the testing of their graduation.)....*On Fluorescence*, by E. Lommel. (An extended discussion of theoretical explanations of the phenomena.)....*On the Intensity of Fluorescent Light*, by E. Lommel.

ANNALES DES PONTS ET CHAUSSEES.—Paris, December, 1877.—*On the Substitution, in Calculations of the Strength of Iron Highway Bridges, of Uniformly Distributed Loads instead of the Actual Loads of Vehicles*, by M. Kleitz. (The new French regulations concerning the erection of highway bridges require that they shall be proportioned to sustain the most unfavorable combination of vehicles weighing eleven tons it on two wheels, or sixteen tons if on four wheels. The article of M. Kleitz discusses the most unfavorable combination of wagons and horses for different lengths of spans, and concludes that the equivalent uniform load in tons per square meter is given very closely by the formula $1{\cdot}876 - 0{\cdot}044\ l$, l being the span in meters)...*On the Conditions for the Opening of Railroads for Light Traffic*, by M. Lechalas. (The cost of narrow-gauge railroads in France is about 22,000 francs per kilometer for permanent way, and about 43,000 for all items.)...*Report of the Commission to Investigate a New Method for Purifying the Sewage of Rheims.* (The method employed by the city is a chemical one, and is regarded by the commission as less satisfactory than direct application to agricultural purposes.)...*On the Increase of the Water Section of Canals under Bridges*, by M. Chabas....*Notes* on the tramways of Philadelphia, on experiments in the flexure of wood, etc

REPORTORIUM FUR EXPERIMENTALPHYSIK.—Munchen, No. 1, 1878.—*The Effect of Annealing on the Galvanic Resistance of Hard Wire*, by O. Chwolson. (An extended discussion of the results of experiments on fifteen different kinds of metal wires.)....*On the Suppression of the Error of Capillarity in a Balance Barograph*, by H. Wild. (The barograph is an apparatus for recording barometric readings, and by Wild's improvement the records are now made automatically as closely as an observer can read.)....*A Hydrometric Meter, with Recording and Electric Signal Apparatus*, by J. Amsler-Laffon. (Similar to meters used for several years in this country.)....*Notes* on a new form of barograph, on a hair hygrometer, and on the regularity of fractures in spectacle glasses.

M. M.

STATISTICS OF COAL PRODUCTION.

This is the only Report Published that gives full and accurate returns of the production of our Anthracite mines.

Comparative statement for the week ending Feb. 16, and years from Jan. 1:

TONS OF 2,240 LB.	1878. Week.	1878. Year.	1877. Week.	1877. Year.
Wyoming Region.				
D. & H. Canal Co.	51,977	347,568	40,307	244,620
D. L. & W. RR. Co.	36,405	269,907	38,179	247,109
Penn. Coal Co.	11,614	86,990	14,145	101,612
L. V. RR. Co.	.....	98,534	27,352	128,314
P. & N. Y. RR. Co.	.....	1,609	1,101	5,602
C. RR. of N. J.	2,570	75,108	17,484	117,758
	102,566	879,716	138,568	845,015
Lehigh Region.				
L. V. RR. Co.	.....	223,959	47,179	279,053
C. RR. of N. J.	18,644	91,722	18,974	104,959
D. H. & W. B. RR.	773	3,204	571	2,514
	19,417	318,885	66,724	386,526
Schuylkill Region.				
P. & R. RR. Co.	3,833	314,767	67,971	462,307
Shamokin & Lykens Val.	2,299	49,334	4,971	48,441
	6,132	364,101	72,942	510,748
Sullivan Region.				
Sul. & Erie RR. Co.	734	4,894	182	1,761
Total	128,849	1,567,596	278,416	1,744,050
Increase	.....	.....	.....	.....
Decrease	149,567	176,454	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

Receipts and shipments of coal at Chicago Ill., for the week ending Feb. 16, and year from Jan. 1.

	Week. Tons.	Year. Tons.
Receipts	12,290	126,109
Shipments	3,918	30,740

Perth Amboy business:

	Tons.
Received for the week	555
Shipped for the week	4,298
On hand Feb. 16	101,516

Receipts of Coal at Boston, for the week ending Feb. 15, and years from Jan. 1:

TONS OF 2,240 LB.	1878. Week.	1878. Year.	1877. Week.	1877. Year.
From				
Alexandria and Georgetown	.....	1,479	.....	.....
Philadelphia	6,500	43,071	5,802	22,147
Baltimore	630	8,362	1,600	5,080
Other places	1,565	35,381	7,537	26,618
Great Britain	.....	3,641	97	707
Nova Scotia	.....	321	.....	.....
Total	8,695	92,255	14,036	54,552

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads amounts to 2,809 tons as compared with the corresponding period in 1877.

The Exports of Coal from Baltimore for the week ending February 15 were 812 tons, and since January 1, 7,957 tons as against 3,254 tons for the corresponding time in 1876.

Belvidere Delaware Railroad Report for week ending February 15:

	Week.	Year. 1878.	Year. 1877.
Coal for shipment at Coal Port (Trenton)	.....	.....	.....
Coal for shipment at South Amboy	1,987	84,733	50,146
Coal for distribution	1,394	18,859	22,642
Coal for Company's use	294	10,938	10,975

The Production of Bituminous Coal for the week ending Feb. 16, was as follows:

Tons of 2,000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2,240 lb.	7,915	92,343
Barclay Region, Pa.		
Barclay R. R., tons of 2,240 lbs.	6,696	40,223
Broad Top Region, Pa.		
Huntingdon and Broad Top R. R.	2,612	17,600
*East Broad Top	1,067	10,021
Clearfield Region, Pa.		
*Snow Shoe	869	4,820
*Tyrone and Clearfield	23,262	120,316
Allegheny Region, Pa.		
*Pennsylvania R. R.	3,942	23,260
Pittsburgh Region, Pa.		
*West Penn. R. R.	3,543	5,493
*Southwest Penn. R. R.	381	4,234
*Penn & Westmoreland gas coal, Pa. R. R.	14,755	100,816
*Pennsylvania R. R.	6,954	44,467

*For the week ending Feb. 14.

The Production of Coke for the week ending Feb. 14:

Tons of 2,000 lbs.	Week.	Year.
West Penn. R. R.	764	6,772
Southwest Penn. R. R.	12,275	90,331
Penn. & Westmoreland Region, Pa. R. R.	801	7,655
Pittsburg, Penn. R. R.	1,151	10,052
Total	14,991	114,810

COAL TRADE REVIEW.

NEW YORK, Thursday Evening, Feb. 21, 1878.

Anthracite.

The week under review has been as dull as several preceding ones. The "coal on the market" continues to be the drawback to full prices. It is claimed, however, that there is not so much cheap coal offering, and that prices are a little better than a week ago; also, that during the last three days there has been a better demand for coal. Although this may be the case, yet the difference between the circular prices and those paid in cash is sufficient to show that the combination has not done what was calculated; and so long as it permits coal to be put afloat without being previously sold, it is not likely to be of any benefit.

The sales-agents held a meeting yesterday, at which they endeavored to encourage one another; they ad-

journed until to-day for a further consideration of prices, when it was sensibly resolved not to make any advance before April 1. The Board of Control will hold a meeting in Philadelphia next Tuesday.

The Delaware, Lackawanna & Western R. R. Co. will sell at auction next Wednesday 50,000 tons of coal.

Messrs. Walter, Donaldson & Co. made an assignment this week to Andrew Kent. This firm has been rated very high, and among the trade generally was supposed to be quite strong. The New York representatives of the firm say that they will not be able to give an estimate of their assets or liabilities until they get a statement from their Philadelphia and Boston houses.

According to the report of the Bureau of Statistics, corrected to Feb. 9, the imports of coal into, and the exports from the United States in 1876 and 1877 were as follows:

EXPORTS.

	1877. Tons.	1876. Tons.
Bituminous	325,854	253,387
Other	378,069	362,044
Total	704,923	615,431

IMPORTS.

Bituminous	498,275	488,132

The following is a dispatch from Bethlehem, Pa., dated February 19:

"The coal operators shipping over the Lehigh Valley Railroad held a meeting here to-day, for the purpose of arranging the percentage of tonnage to be allowed some new collieries and others that did not ship coal during 1876 and 1877. The allotment agreed upon was satisfactory, and a committee of three was appointed to settle such questions in the future."

This indicates that mines which, under open competition, could not be worked now become participants in the trade under a combination.

The three Lackawanna companies furnished about two-thirds of the 149,567 tons produced last week. The output for the corresponding week last year was 278,416 tons, and for the previous week this year, 229,111 tons. The total production from January 1, has been 1,567,596 tons as against 1,744,050 tons for the corresponding period of 1877, showing a falling off this year of 176,454 tons.

A dispatch to the *Post* says:

"ALBANY, February 21.—The Railroad Committee of the Assembly will meet at the St. Nicholas Hotel, New York, at 10 o'clock on Monday forenoon, to take testimony relative to the coal combination, as directed by the resolution of Mr. Browning. Presidents Sloan and Dickson have been subpœnaed by the Sergeant-at-Arms.

Bituminous.

There is still no business to note, although there are some inquiries about coal for season's delivery. The new mining law proposed for Maryland is under the consideration of a Senate committee and will probably be greatly modified. The Hampshire & Baltimore and Caledonia mines are still at work at 40 cents per ton. At the other mines there is nothing being done, the companies proposing 40 cents and a ton of 2,400 lb., to which the miners have not yet submitted; but from the unanimity that appears to exist among the companies, there does not seem to be a doubt that the miners must yield. It is anticipated that the Chesapeake & Ohio Canal will be opened by April 1.

New York.

Wholesale Prices of Anthracite Coal f. o. b. at Tide Water Shipping Ports, per ton of 2,240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.						
Lackawana, at Weehawken	$3 25	$3 25	$3 25	$3 25	$3 75	$3 50
*Pittston, at Weehawken	3 25	3 25	3 25	3 35	3 75	3 50
Wilkesbarre, at Port Johnson	3 25	3 25	3 25	3 35	3 75	3 25
Lehigh Valley Coal Co., at Amboy	.....	3 50	3 25	3 35	3 75	.....
Plymouth R. A., at Port Johnston	.....	.....	3 25	3 45	3 85	3 35
LEHIGH						
Old Company's, at Port Johnston	3 75	.....	3 40	3 50	3 75	3 25
Honey Brook Lehigh, at Port Johnston	3 75	.....	3 40	3 50	3 75	3 25
Lehigh Valley Coal Co., at P. Amboy	3 75	.....	3 50	3 50	3 75	3 25
Mount Pleasant, at Hoboken	3 50	.....	3 50	3 50	3 75	3 00
Hazelton, at Hoboken	3 50	.....	3 50	3 50	3 75	3 00
Cross Creek, at Port Johnston	3 75	.....	3 50	3 50	3 75	3 20

* Forty cents per ton additional for delivery in New York.

Wholesale Prices of Bituminous Coal.

DOMESTIC GAS COALS.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Pennsylvania—		
At Greenwich, Philadelphia	$4 70	$5 50
At S. Amboy	5 00	5 50
Kanawha at Richmond	4 10	5 40
Red Bank Cannel, Pa., at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt	4 50	5 65
Despard, West Va	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburg Orrel. Md. " "	4 50	6 00
Cannelton Cannel, West Va	....	10 00
" Splint " at Richmond	6 00	7 00
" Gas Coal at Richmond	4 00	5 65
Peytona Cannel, W. Va., at Richmond	....	10 00

MANUFACTURING AND STEAM COALS.

Cumberland at Georgetown and Alexandria	2 85@3 10	4 35@4 50
Cumberland, at Baltimore	3 10@2 25	4 35@4 50
Cl'rf'd "Eureka" and "Franklin."		
At mines	0 75	....
At Baltimore	3 25	4 50
At Philadelphia	3 25	4 50

FOREIGN GAS COALS.

	Sterling.	Am. cur'ncy.
Newcastle, at Newcastle-on Tyne	8s.6d.@10s.6d.	$5 50@ $6 00
Liv. House Orrel, at Liv.	25s.	13 00
Ince Hall Cannell "	35s.6d.	18 00
" Gas Cannel "	25s.6d.	10 00@ 10 50
Scotch Gas Cannel, at Glasgow, nominal	25s.	7 50
	Gold.	
Bl'k House, at Cow Bay, N.S.	$1 75	$4 50
Caledonia, at Pt. Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 60	4 25
Lingan, at Lingan Bay	1 75	....
Intern'l Mines, at Sydney	1 75	4 50
Pictou, Vale Mines, at Pictou	2 00	4 70

Retail Prices.

Per ton of 2,000 lb,

Anthracite.

	G. & Egg.	Stove.	Chest.
Pittston coal delivered	$5 00	$5 00	$5 00
Lack. coal, delivered below 59th St.	4 50	4 50	4 50
Wilkes-Barre, delivered above Canal Street	4 50	4 75	4 50
Wilkes-Barre, deliv'd below Canal Street	4 25	4 50	4 25
Lehigh and Locust Mountain, delivered above Canal Street	5 00	5 00	4 75
Lehigh and Locust Mountain, delivered below Canal Street	4 50	4 75	4 50

Bituminous.

Liv. House Orrel	$18 00	American Orrel	$11 00
Liv. House Cannel	18 00	Red Bank Cannel	7 00
Am. "	11 00	Cumberland	9 00
Ca'n'lt'n Bl'k, or splint.	10 00		

Baltimore. Feb. 21, 1878.

Specially reported.

Wholesale Prices per ton of 2,240 lb.

In cars at Depot N. C. R. R.

HARD WHITE ASH, FREE-BURNING WHITE ASH, SHAMOKIN, ETC.

Lump and Steamboat	$4 15	Stove	$4 50
Broken	4 20	Chestnut	4 00
Egg	4 30		

LYKENS VALLEY RED ASH.

Broken, Egg and Stove.	$4 55	Chestnut	$4 15

From yard or wharf to dealers, 75c. per ton additional for all kinds and sizes.

Buffalo, N.Y. Feb. 21, 1878.

[Specially reported by C. M. UNDERHILL.]

The Delaware, Lackawanna & Western Railroad Co. will sell their Scranton coal, the Delaware & Hudson Canal Co. will sell their Lackawanna coal, and J. Langdon & Co. will sell their Henry Clay and Mount Carmel Black Diamond coals, at the following prices per ton of 2,000 lb. for Buffalo local trade for the present:

	To DEALERS.		To CONSUMERS.	
	On car or boat.	In yard, screened.	Delivered at yard.	Retail.
Grate	$4 20	$4 30	$5 45	
Egg	4 20	4 30	5 45	
Stove	4 45	4 55	5 70	
Chestnut	4 35	4 45	5 60	
Blossburg	3 85	4 35	5 00	

[Specially reported by LEE & LOOMIS.]

Per ton of 2,000 lb. delivered on cars.

	Lump.	Run of Mine.	Nut.	Slack.
Connellsville coke	$5 00	.....	.....	.....
Brookfield Coal	3 55	.....	.....	.....
Brier Hill	3 55	.....	.....	.....
" " 2d quality	3 30	.....	.....	.....
Youghiogheny	4 00	.....	.....	.....
Monterey	.....	2 85	.....	2 00
Catfish	.....	2 85	.....	2 00
Stoneboro'	.....	.....	2 75	2 00
Sterling Cannel	5 00	.....	.....	.....

Boston. Feb. 16, 1878.

Our quotations below are based on the combination prices, with freights and insurance added. The wholesale market is somewhat nominal, as is usually the case at this season of the year, retailers being well supplied. The few sales effected are understood to be 25@40c. under the combination figures. The mining companies continue to curtail production, in accordance with their agreement. The schooner Veritas, which cleared this week for Liverpool, N. S., took 30 tons coal—a new feature of the trade.

We quote wholesale prices as follows:

Anthracite, broken	$4 80	Caledonia	$4 50
do egg	4 80	Cannel, English	18 00
do stove	5 30	do Library	15 00
Franklin	5 75	do Buckeye	11 00
Cumberland	4 90@5 00	Penn	6 25
Clearfield	4 75@4 90	Youghiogheny	6 25
Westmoreland	6 25		

[*Commercial Bulletin.*

Cleveland, O. Feb. 21, 1878.

[Specially reported by F. A. BATES, Esq.]

Per ton of 2,000 lb. f.o.b. vessels.

WHOLESALE.

Brier Hill (Church Hill)	$3 30
" " No. 2 Grades	3 10
Straitsville Lower Vein	2 75
Hocking Valley	2 75
Massillon (No. 2 grades 15 cents less)	2 75
Tuscarawas Valley	2 30
Columbiana	2 30
Nut coal, various grades	$1 90@2 20
Screenings " "	1 35@1 75
Youghiogheny gas coals	3 75

RETAIL TRADE.

	1 to 10 tons Tons.	Upw'd
Brier Hill lump	$4 60	3 75
Massillon and Mineral Ridge lump	3 75	3 50
" " " nut	3 50	3 25
Straitsville Lower Vein and Hocking lump	3 60	3 35
" " " nut	3 40	3 15
Rich Hill lump	3 50	3 35
" nut	3 25	3 00
Columbiana, lump	3 00	2 75
" nut	2 50	2 35
Lacka'a., Wilkes-Barre and Pittston egg and grate	6 10	5 85
Lackawanna, Wilkes-Barre and Pittston stove	6 25	6 00
" " " chestnut	6 25	6 00

Lehigh $1 per ton higher.

All sales to be strictly cash with order or C.O.D.

Chicago, Ill. Feb. 21, 1878.

[Specially reported by Messrs. RENO & LITTLE.]

Retail prices of coal delivered per ton of 2,000 lb.

Lakawanna Stove	$6 75	Erie and Brier Hill	$5 50
" Chestnut	6 75	Wilm'gton & Ill.	$3 50@4 00
" Grate	6 75	Blossburg	6 50
" Egg	6 50	Piedmont	7 50

Cincinnati, O. Feb. 13, 1878.

[Specially reported by the Consolidated Coal & Mining Co.]

Per bushel of 72 lbs.

	Retail delivered.	Wholesale afloat.
Youghioghney	11c.	7½c.
Camden	9c.	5½c.
Cannel	17@18c.	13c.

Anthracite, delivered, $7@$8 per ton of 2,000 lbs.

Hamilton, Ont. Feb. 21, 1878.

[Specially reported by H. BARNARD.]

Retail prices delivered per ton of 2,000 lb.

Scr. or Wilkes-B. Grate	$5 00	Lehigh Lump	$6 00
" " Egg	5 00	Brier Hill	5 50
" " Stove	5 25	Massillon	4 50
" " Nut	5 25	Smithing	5 50

Indianapolis, Ind. Feb. 20, 1877.

[Specially reported by Messrs. COBB & BRANHAM.]

WHOLESALE BITUMINOUS.

On board cars, per ton of 2,000 lb.

White River	$2 65	Hocking Valley	4 25
Brazil Block	2 60	Raymond City	4 60
Highland, grate	2 25	Youghiogheny	4 60
Indiana Cannel	4 60	Blossburg (smithing)	6 10
Peytona	5 75	Piedmont "	6 10

Per car, 12 tons.

Block coal, nut	$18 00	Block Slack	$17 00
Highland, "	18 00		

RETAIL BITUMINOUS.

Delivered per bushel of 70 lb.

White River	13c.	Block Nut, steam use	8c.
Brazil Block	13	" Slack, "	7
Highland Grate	11	Virginia Cannel	25
Block Nut, domestic use	11	Youghiogheny	18
Highland Nut, "	11	Blossburg	26
" " steam	8		

GAS COKE.

Per bushel, measure containing 2,888 cubic inches.

Retail, crushed	14c.	Wholesale	9c.
" lump	12		

ANTHRACITE.

Per ton of 2,000 lb.

Wholesale on Cars.		*Retail delivered.*	
Wilkes-Barre, all sizes	$5 75	Wilkes-Barre, all sizes	$7 50
Lackawanna, "	6 25	Lackawanna, "	7 00
Lehigh "	6 75	Lehigh, "	7 00

Louisville, Ky. Feb. 20, 1878.

[Specially reported by Messrs. BYRNES & SPEED.]

Wholesale per bushel of 72 lb.

Pittsburg	8c.	Raymond City	7½c.
Ashland (Ky.)	7	Kentucky, on cars	8

Retail.

Pittsburg	$3 00	Anthracite, per ton	$7 50
Raymond City	2 75	City Made Coke, per bsh	7c.
Ashland (Ky.)	2 50	Soft Coke, per bushel	7c.
Pittsburg nut	2 50		

Montreal. Feb. 21, 1878.

[Specially reported by Messrs. ROBERT C. ADAMS & Co.]

Wholesale per 2,240 lb.

Scotch Steam	$4 75	Cape Breton Steam	$4 25
Pictou	4 50	Newcastle Smith's	6 00

Anthracite at retail, per 2,000 lb. delivered.

Stove	$6 50	Chestnut	$6 00
Egg	6 00		

Milwaukee, Wis. Feb. 20, 1878.

[Specially reported by Messrs. R. P. ELMORE & Co.]

Retail price per ton of 2,000 lb.

Anthracite, Egg, Chestnut and Stove	$6 50		
Lehigh lump	$7 00	Connellsville coke on	
Brier Hill	5 25	RR. track	7 25
		Straitsville	4 80

New Orleans, La. Feb. 15, 1878.

[Specially reported by Messrs. C. A. MILTENBERGER & Co.]

Stock good. Demand brisk.

PITTSBURG COAL.

At wholesale (by boat-load)	28c.	per bbl. of	180 lb.
To steamboats	45c.	"	"
" manufactories	45c.	"	"
" families	60c.	"	"

In hhds. (for shipment) .... $5.50 per hhd. from 5 to 6 bbls.

ANTHRACITE COAL

Per ton of 2,000 lb.

At wholesale	$7 00 to $8 00
To families, etc	9 00 to 10 00

ST. BERNARD (KY.) COAL.

To steamboats	40c.	per bbl. of	180 lb.
" families	50c.	"	"
Virginia cannel to families	$1.00	"	"

Pittston, Pa. Feb. 21, 1878.

Pennsylvania Coal Company's Coal in Yard.

Retail per ton of 2,000 lb.

Lump, Egg, and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, 50 cents per ton additional.

Richmond, Va. Feb. 21, 1878.

[Specially reported by S. H. HAWES, Dealer in Coal.]

Per ton of 2,240 lb. f.o.b.

Kanawha Cannel	$9 00	New River Bituminous	$3 70
Coalburg Splint	5 70	Clover Hill Coal	3 00
Lewiston	5 70	Norwood Gas and	
Kanawha Gas Coal	4 90	Steam Coal	2 70

San Francisco, Cal.

From the *Commercial Herald* of February 14.

Imports from January 1 to February 1:

	Tons.		Tons.
Anthracite	1,399	Vancouver Island	5,311
Australian	8,148	Seattle	2,122
Coos Bay	3,360	English	13,836
Cumberland	152	Mt. Diablo	7,973
Bellingham Bay	1,700		

The arrivals from the northern coast mines have of late been few and far between, by reason of adverse winds, stormy weather, etc., the few vessels reaching port making long voyages. Prices, however, have undergone no improvement worthy of note, although many consumers are forced to use foreign in lieu of the domestic article. The arrivals during the week embrace the following: Ship Shirley, 1,500 tons Wellington; Henry Buck, 1,065 Nanaimo; Lizzie Williams, 1,277 Seattle; brig Hazard, 500 tons Wellington. We quote Australian cargoes, $7@7.25; Coast, $6; West Hartley, $8@8.50; Scotch Steam, $6.50@6.62½. Two cargoes of Wallsend have been sold within the week—one at $7, and the other higher. The market is slack at the close:

The comparative imports and receipts for January, 1877-8 were as follows: 1877, 41,501 tons; 1878, 44,620 tons; increase this year, 3,119 tons.

Our monthly receipts from Mount Diablo mines for a period of years are as follows:

	1874.	1875.	1876.	1877.	1878.
January	15,145	14,181	8,653	5,303	7,973

Sandusky, Ohio. Feb. 20, 1878.

[Specially reported by C. E. BLACK, Agent Con. Coal and Mining Company.]

We quote coal on cars at Sandusky, as follows:

Per ton of 2,000 lb.

ANTHRACITE.

	Grate.	Egg.	Stove.	Chest.
Lehigh	$6 50	$6 50	$6 50	$6 50
Wilkes-Barre	5 75	5 75	5 75	5 75
Lackawanna	5 75	5 75	5 75	5 75

BITUMINOUS.

Massillon	$3 00	Straitsville	$2 70
Del Carbo	2 75	Shawnee	2 70
Hocking Valley	2 70	Blossburg	4 75

Prices retailed delivered 50c.@75c. above car prices.

St. Louis, Mo. Feb. 20, 1878.

[Reported by JAMES J. SYLVESTER, Secretary of the Anthracite Coal Association.]

Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.

	Per ton.		Per ton.
Lackawanna	$8 00@8 50	Schuylkill	$8 00@8 50
Wilkes-Barre	8 00@8 50	Lehigh	9 00@9 50

BITUMINOUS.

Blossburg	$9 00	Big Muddy	$3 00
Pittsburg	4 50	Illinois Coals	2 50@3 00
Indiana Block	4 00	Connells. Coke	6 50

Toledo, Ohio. Feb. 20, 1878.

[Specially reported by Messrs. GOSLINE & BARBOUR.]

We report prices of coal on cars at Toledo as follows:

Ton of 2,000 lb.

Straitsville lump	$2 70	Hocking Valley nut	$2 30
" nut	2 30	Massillon lump	3 00
Shawnee lump	2 70	Cumberland	5 40
" nut	2 30	Blossburg	5 40
Hocking Valley lump	2 70		

Prices of hard coals on cars at Toledo areas follows:

Ton of 2,000 lb.

	Grate.	Egg.	Chestnut.	Stove
Pittston	$5 55	$5 55	$5 70	$5 80
Wilkes-Barre	5 55	5 55	5 70	5 80
Lackawanna	5 55	5 55	5 70	5 80
Lehigh	6 15	6 15	6 30	6 40

For retail delivery in city the prices are as follows: Stove and chestnut $6.45; grate and egg, $6.20 per ton; Lehigh 60c. per ton additional.

Prices soft coal f.o.b. vessel for Lake shipments will be from 15 to 20c. per ton more than prices on cars.

OFFICE OF THE PA. & N. Y. R. R. Co.,
Bethlehem, Feb. 1. 1878.

On and after this date the rate on coal for Buffalo, Watkins Ithaca and Weedsport, for water shipment; Auburn, for New York Central Railroad; Sterling, for Lake Ontario Shore Railroad, and Fair Haven, will be $1 per gross ton, between Coxton and Waverly. On coal for Rochester, via Erie R. W., Salamanca and points west thereof, an additional charge of 10 cents per ton will be made to cover transhipment charges at Waverly. The full rate from Coxton to Buffalo is $2.75, to Rochester $2.47. Local rates of August 6 will go into effect the same date.

ROBERT H. SAYRE, President.

Freights.

Per ton of 2,240 lb.

Representing the latest actual charters to Feb. 20, 1878.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me			
Albany			
Alexandria, Va			
Brooklyn, N. Y			
Bangor, Me			
Bath, Me			$1 50
Baltimore			
Boston, Mass	$1 65	$1 60	1 50
Bridgeport, Conn.		1 40	70
Bristol, R. I			90
Beverly, Mass			1 50
Cambridge, Mass.			1 50
Charleston, S. C.			
Danversport, Mas			
East Cambridge, Mass			
Fredericksbrg, Va			
Fall River		1 40	90
Gloucester			
Georgetown, D.C.			
Hartford, Conn			
Hoboken			40
Hudson, N. Y			
Jersey City			40
Lynn, Mass			
Marblehead, Mass			
Middletown			90
Milton, Mass			
Nantucket, Mass.			90
New Bedford		1 40	90
Newburyport		1 75	1 75
New Haven		1 40	70
New London		1 40	70
Newport			90
New York	1 10	1 25	40
New Orleans, La.			
Norfolk, Va			
Norwich			90
Norwalk, Conn			1 00
Philadelphia			
Portland	1 60	1 60	1 50
Portsmouth, N.H.		1 75	1 65
Providence	1 50	1 40	90
Quincy P'nt, Mass			
Rockport			
Richmond, Va			
Saco			
Salem, Mass		1 60	1 50
Saybrook, Mass			
Savannah, Ga	1 30		
Somerset, Mass			90
Troy			
Wareham			
Washington	1 25		
Wilmington, N.C.			
Wilmington, Del.			

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

IRON MARKET REVIEW.

NEW YORK, Thursday Evening, Feb. 21, 1878.

American Pig.—There has been no business worthy of note transacted since our last week's report. There is neither enough inquiry for iron nor a sufficient quantity being pressed for sale to determine prices. Although nominally unchanged they have been influenced by the dull market which has ruled for nearly three months, and are, if anything, perhaps a shade weaker. We quote No. 1 foundry at $18@$19; No. 2 foundry, $17@$18, and forge, $16@$17.

We are in receipt of the revised Report of the Bureau of Statistics, from which we learn (where quantity is reported) that the imports in 1877 were but 221,646,478 lb. of iron and steel, against 255,956,075 lb. in 1876; while the value for the former year was but $9,195,418 as against $10,599,787 for the latter. This statement is satisfactory, but that of the export values more so, they having amounted to $16,659,538 in 1877 as against only $11,798,459 in 1876. These figures show that even in the iron trade we have a liberal balance of trade in our favor.

Scotch Pig.—There is only a retail business being done in this article. Prices are unchanged since last week, and as follows: Eglinton, $23@$23.50; Glengarnock, $24@$24.50, and Coltness, $25@$25.50.

Rails.—In these we learn of no transactions, and quote, $42@$43 at mills for steel, and $33@$36 for iron.

Old Rails.—We note a sale of 500 tons on private terms, and quote at $19@$20.

Wrought Scrap.—We are reported a sale of 500 tons on private terms; and continue to quote at $22@$23.

Baltimore, Md. Feb. 18, 1878.

[Specially reported by Messrs. R. C. HOFFMAN & Co.]

We quote present prices of iron as follows:

Balt. Char	$29 00@$30 00	M. & White	$14 00@$15 00
Va. "	28 00@ 30 00	C'lC.B.Blooms	50 00@ 55 00
Anth. No. 1	19 00@ 20 00	" " Billetts	55 00@ 60 00
" " 2	18 00@ 19 00	Refi'd Blooms	45 00@ 50 00
" " 3	17 00@ 18 00		

Buffalo. Feb. 14, 1878.

[Specially reported by Messrs. PALEN & BURNS.]

No. 1 Foundry	$20 91
No. 2 "	19 91
Gray Forge	18 91
American Scotch A 1	24 25
Cherry Valley B 1	23 25
" " No. 2	22 25

Chattanooga, Tenn. Feb. 18, 1878.

[Specially reported by J. F. JAMES, dealer in iron & metals.]

Tenn., Ala. & Ga. Charcoal, No. 1 Foundry	$18 00@$19 00		
Tenn., Ala. & Ga. Charcoal, No. 2 Foundry	17 00@ 18 00		
Tenn., Ala. & Ga. Charcoal, Gray Forge	15 00@ 16 00		
Tenn., Ala. & Ga. Coke, No. 1 Foundry	19 00@ 20 00		
Tenn., Ala. & Ga. Coke, No. 2 Foundry	17 00@ 18 00		
Tenn., Ala. & Ga. Coke, Gray Forge	15 00@ 16 00		
Tenn., Ala, & Ga. cld B. (car-wheel)	20 00@ 28 00		
Charcoal or Coke, white and mottled	14 00@ 15 00		
Old rails	$18 00@$19 00	Wr'ght scrap,	
Old car wh'ls.	16 00@ 17 00	No. 2	$12 00
Wr'ght scrap, No. 1	17 00	Cast scrap	10 00
		Muck bar	32 00@ 33 00

Iron Ores.

Red Hematite (about 55 per cent. metallic iron) f. o. c. at mines	$1 25
Brown Hematite (about 55 per cent. metallic iron)	1 75

Cincinnati, O. Feb. 19, 1878.

[Specially reported by Messrs. TRABER & AUBERY, Commission Merchants for the sale of pig iron, blooms, ore, etc.]

Below please find closing quotations of our pig iron market, viz.:

CHARCOAL.

H'n'g Rock	No. 1 Foundry & B 1	$22 00@$23 00	—4 mos.
"	No. 2 "	21 00@ 22 00	—4 mos.
"	Soft Silver Gray	20 00@ 21 00	—4 mos.
"	Mill	18 00@ 19 00	—4 mos.
Tennessee	No. 1 Foundry	21 00@ 22 00	—4 mos.
"	No. 2 "	20 00@ 21 00	—4 mos.
"	Mill	18 00@ 19 00	—4 mos.

STONE COAL.

Ohio	No. 1 Foundry	$20 00	—4 mos.
"	No. 2 "	19 00	—4 mos.
"	Nos. 3 and 4 "	18 00@ 17 00	—4 mos.
"	Mill	18 00	—4 mos.

COKE.

Ohio & W. Va.	No. 1 Foundry	$20 00@$21 00	—4 mos.
" "	No. 2 "	19 00@ 20 00	—4 mos.
" "	Mill	18 00@ 19 00	—4 mos.

CAR-WHEEL.

H'n'g R., C. B	Hecla, Vesuvius, Etna, Jefferson.	$38 00	—4 mos.
Maryland,	Cedar Point	37 00	—4 mos.
Missouri,	Maramec	30 00	—4 mos.
Alabama,	Woodstock	32 00	—4 mos.

BLOOMS.

Charcoal	$45 00@$50 00—cash.

SCRAP IRON.

Cast	40 c.@ 45c.—cash.
Wrought	02½c.@$1 00—cash.

Columbus, Ohio. Feb. 18, 1878.

[Specially reported by Messrs. KING, GILBERT & WARNER, dealers in Pig Iron and Ores.]

The demand for pig iron continues fairly active and the market shows but little change from last week. The usual time, four months, allowed on following quotations:

FOUNDRY IRONS.

No. 1 Hanging Rock Charcoal	$23 50@$24 00
No. 2 "	22 00@ 22 50
No. 1 Hocking Valley soft and strong from pure limestone ores	21 50@ 22 00
No. 2 Hocking Valley soft and strong from pure limestone ores	20 50@ 21 00
No. 1 American Scotch	20 50@ 21 00
No. 1 Moxahala	21 50@ 22 00
No. 2 "	20 50@ 21 00
No. 1 Shawnee	20 50@ 21 0
No. 1 Eliza (Jackson County)	20 50@ 21 00
Silver Gray	18 00@ 19 00

MILL IRONS.

Gray neutral	18 50@ 19 00
Mottled and white neutral	17 50@ 18 00
Gray cold short	17 50@ 18 00
Mottled and white cold short	16 50@ 17 00

Cleveland, O. Feb. 18, 1878.

[Specially reported by Messrs. C. E. BINGHAM & Co.]

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1	L. S. Charcoal	$25 00	Am. S., No. 1, Ch. Val	$24 00
No. 2	" "	25 00	" " B—1, " "	23 00
No. 1	Anthracite	23 00	" " No. 2 " "	22 00
No. 2	"	21 00	No. 1, Massillon	24 00
No. 1	Bituminous	23 00	B—1, "	23 00
No. 2	"	21 00	No. 2, "	22 00

CAR-WHEEL AND MALLEABLE IRON.

No. 3, L. S. Charcoal		$26 00	No. 5 & 6, L. S. Char	$27 00
No. 4, " "		26 00		

BESSEMER IRON.

No. 1 & 2, L. S. Char	$25 00

FORGE IRON.

No. 1, Gray.....$20 00 | White and Mottled....$19 00

Louisville, Ky. Feb. 19, 1878.

[Specially reported by Messrs. GEORGE H. HULL & Co.]

No change in the state of the pig iron market worth mentioning. Demand moderate without change in prices. The usual time, four months, allowed on quotations below:

MILL IRONS.

No. 1 Charcoal, Cold-short & Neutral	$18 00@$19 00
No. 1 Stc'l & Coke, Cold-short & Neutral	17 00@ 18 50
No. 2 Stc'l & Coke, Cold-short & Neutral	16 00@ 17 00
No. 1 Missouri and Indiana, Red-short	20 00@ 22 00
White & Mottled, Cold-short & Neutral	14 00@ 16 00

FOUNDRY IRONS.

	No. 1.	No. 2.
Hanging Rock Charcoal	$22 00@$23 00	$20 00@$21 00
Southern Charcoal	20 00@ 21 00	18 50@ 19 50
H'n'g Rock, Stc'l & Coke	20 00@ 22 00	19 00@ 20 00
Southern Stonecoal & Coke	19 00@ 20 00	18 00@ 19 00
"American Scotch"		20 00@ 22 00
Silver Gray		18 00@ 19 00

CAR-WHEEL AND MALLEABLE IRONS.

Hanging Rock, Cold Blast	$34 00@$37 00
Alabama and Georgia, Cold Blast	24 00@ 33 00
Kentucky, Cold Blast	26 00@ 33 00

Milwaukee, Wis. Feb. 18, 1878.

[Specially reported by Messrs. R. P. ELMORE & Co.]

CHARCOAL IRON.

No. 1 Lake Superior per gross ton	$23 00—4 mos.
" 2 " " " "	22 00—4 mos.

ANTHRACITE IRON.

No. 1 Anthracite per gross ton	24 00—4 mos.
" 2 " " " "	23 00—4 mos.

STONE COAL AND COKE.

Warner's Am Sc'th (Bk. Band, per ton	$25 00@ ....—4 mos.
Soft Silvery per ton	22 00@23 00—4 mos.
Ohio Stone Coal	22 00@23 00—4 mos.

CAR WHEEL.

Lake Superior ores per ton	$25 00@27 00—4 mos.

Pittsburg, Pa. Feb. 19, 1878.

[Specially reported by A. H. CHILDS.]

There is no important change in the condition of the market since last report. The mills are mostly in operation and forge irons moderately active to supply current wants, but there is no scarcity of supply, and no immediate prospect of any better prices than are now ruling. Foundries are doing but little, and this grade of metal is especially dull.

	4 mos.		4 mos.
No. 1 F'dry	$20 00@$21 50	M. & White	$16 00@$17 00
No. 2 "	19 00@ 20 00	Hot Blast Ch.	20 00@ 25 00
Gray Forge	17 50@ 20 00	Cold Blast W.	@ 35 00

Richmond, Va. Feb. 20, 1878.

[Specially reported by ASA SNYDER, Esq.]

Our market shows considerable animation in foundry grades of pig iron. Sales are on the basis of the following quotations:

Amer. Scotch Pig Iron	$23@$24
Anthracite " " No. 1	20@ 21
" " " No. 2	19@ 20
" " " No. 3	18@ 19
" " " Mottled	16@....
Coke " " No. 1	22@....
" " " No. 2	21@....
Virginia Cold Blast Charcoal Pig Iron, cold short	20@ 24
" " " " " " neutral	28@ 29
" Warm " " " " cold short	19@ 22
" " " " " " red short silver grey	18@....
Old Rails	17@ 18
Wrought scrap No. 1	20@....
Cast scrap — Machinery	18@....
Richmond Refined Bar Iron	2@2¼c
Horse-shoes	$4 50@4 75
Mule-shoes	5 75@ ....
Old Dominion nails (standard size)	2 50 keg.

St. Louis, Mo. Feb. 19, 1878.

[Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.]

There is no change in the condition of our market since our last report. Prices are unchanged and demand is very light.

COLD BLAST CHARCOAL—ALL NUMBERS.

Hanging Rock	$25@$28	Assorted Bar Iron	$2, rates.
Tennessee	26@ 30	No. 1 Wr'ght Scarp,	80c. cwt
Kentucky	26@ 30	Heavy cast "	65c. "
Missouri	26@ 30	Light " "	55c. "
Georgia	26@ 30	Old rails	$19 00@$20 00
Alabama	26@ 30	Old carwheels	17 00@ 18 00

	No. 1.	No. 2.	Mill.	White and Mottl'd
Missouri stone coal	$22 00	$21 00	$20 00	$19 00
" charcoal	22 00	21 00	20 00	20 00
Tennessee charcoal	22 50	21 00	20 00	19 00
Tenn. coke very soft and strong	23 00	21 00	20 00	18 50
Hanging Rock charcoal	25 00	24 00	23 00	.....
" " cold short	24 00	23 00	.....	.....
	ExNo.1	No. 1.	B No.1.	No. 2.
Alice Hanging Rock coke.	$25 00	$24 50	$24 00	$22 50
Quinnimount, W.Va., coke.	23 50	23 00	22 00	21 00

METALS.

NEW YORK, Thursday Evening, Feb. 21, 1878.

The period under review has been one of the quietest of the year. Everything is in a state of uncertainty; the Silver Bill affecting the market here, and the war question in Europe influencing that in London.

The following are some of the revised figures of United States imports and exports for 1876 and 1877, furnished by the Bureau of Statistics:

	1877.	1876.
IMPORTS:		
Tin, tons	6,026	4,849
Lead, lb	15,178,509	12,717,067
Spelter, lb	1,138,490	504,958
Sheet zinc, lb	1,352,149	1,901,914
Tin plates, cwt	2,248,584	1,798,942
EXPORTS:		
Ingot copper, lb	11,505,032	16,624,902
Copper ore, cwt	31,703	17,211
Mfgs. of copper	$226,059	$178,082
Lead and mfgs. of	$75,024	$25,842
Quicksilver, lb	3,626,713	2,819,576
Cartridges and fuses	$3,372,822	$1,553,527
Tin and mfgs. of	102,861	59,121
Zinc and mfgs. of	2,001,095	721,240

Gold Coin.—The price of gold has ranged from 102⅜ to 101⅝, and closed at 101⅞.

Bullion.—The London market for silver was low and weak at the date of our last, but opened on Monday at an advance of ⅜d.@⅛d., without any apparent cause, aside from the passage of the Silver Bill in our higher legislative house. Since Monday it has advanced daily in London until it now stands at 54⅛d. As it was generally believed abroad and here, that the bill would pass our Senate, and that the amount of silver to be coined under it would not be a large or material amount, so far as the London market is concerned, it is quite probable that this alone accounts for the remarkable rise in the price of silver in that money center, and inclines good judges to the opinion that some factitious influences have been brought to bear to produce this result, and also to the belief that the present rates will not long hold unless supported by more substantial causes than now appear.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Feb. 16	53⅞	116¾	Feb. 20.	54⅛	....
Feb. 18	54¼	117	Feb. 21.	54⅛	....
Feb. 19	54 5-16	117⅛	Feb. 22.	....	....

BULLION SHIPMENTS.

Jan. —. Tybo cons., Nev	$54,000
" Pioche, "	13,074
" California, "	1,774,069
" Con. Virginia, "	1,611,271
" Grand Prize, Cal.*	2,000,000

* Total for year 1876.

Storey County, Nev.—The official yield for the quarter ending Dec. 31, 1877, has been $9,934,126.38, or nearly $10,000,000, equal to about $40,000,000 a year.

Copper.—We quote sales of 50,000 lb. of Tennessee copper at 17c. cash; 50,000 lb. Lake Superior for delivery at the end of the month at 17½c., and 50,000 lb. at 17⅛c. cash. There is a report that 100,000 lb. of Lake copper has been sold at 17½c.; but this is unquestionably erroneous. The market is very quiet, although considerable copper could be sold at 17⅛c. The Wallaroo sale, which occurred on Tuesday, averaged £75, 17s. 6d. The quantity sold was 734 tons. The San Francisco *Commercial Herald*, referring to the Pacific Coast product, says: "There is every indication pointing to a very extended increase in the copper product in the year now before us."

The quantity of Chili bars, ores and regulus in stock at, and afloat for, Liverpool, Swansea and Havre, and of English and foreign copper in London, is thus estimated in fine copper:

	Feb. 1, 1878.	Feb. 1, 1877.	Feb. 1, 1876.
Stock	30,753	26,363	19,932
Chili produce shipping and afloat per mail advices	6,800	10,100	7,750
Total ....Tons	37,553	36,463	27,682
	Feb. 1, 1878.	Feb. 1, 1878.	Feb. 1, 1877.
Stock	30,753	30,676	29,974
Chili produce shipping and afloat per mail advices	6,800	7,000	5,700
Total....Tons	37,553	37,676	35,674
Chili produce chartered for per cable advices received up to date	4,600	2,900	4,500
Australian produce afloat	2,100	1,000	800

Tin.—The latest cable advices quote Straits in London at £63 10s., and at Singapore at $18.75. There is but a jobbing business doing in this market. We quote Straits at the close at 14½c.; L. & F., 14½@14⅝c.; Refined nominal, 14¾c. Prices all in gold.

Messrs. Vivian, Younger & Bond, of London, under date of February 8, say of tin: "The deliveries for last month were so good, especially considering the general state of the metal trade, that our figures are not so unfavorable as might have been expected in view of the large quantity afloat. The present quotations appear to be generally accepted as likely to be about the ruling ones in the existing state of the stocks, supplies, etc. The market gradually gave way during the past month from 65s. for Straits and Australian, until 63s. was touched. At this point buyers came forward, and a fair quantity was taken on speculation and for investment, causing a rally to 64s. The market is again easier, and 63s. 6d., sellers, is the closing quotation, though at 63s. buyers would still go on. English has sold down to 67s. for common ingot. The deliveries of foreign from London warehouses were 1,147 tons, exclusive of 440 tons straits over side to America. At the Banca sale on the 30th ult., 18,106 slabs were sold at an average of 40·35 fls., or equal to about 68s. 6d., delivered here. The stock of foreign tin in London and Holland is thus estimated:

	1878		1877.
	1st Jan.	1st Feb.	1st Feb.
Foreign tin in London	8,479	8,268	7,865
Banca tin in Holland	1,172	1,485	1,450
Ditto in company's hands	876	438	449
Billiton tin in Holland	1,203	1,318	930
	11,730	11,509	10,694
Quantity of tin afloat for Europe	3,800	5,000	4,500
Quotations on the same dates being for Straits	£65 10s	£63 0s	£73 10s

The quantity of tin in stock and afloat is equal to more than a whole year's requirements based upon January deliveries.

Tin Plates.—There is a fair jobbing business doing in these. We quote in gold, per box, as follows: Charcoal tins, $5.87½@$6.12½ and ternes $5.75@$5.70; coke tins $5.25@5.37½, and ternes $5.37½.

Messrs. Robert Croops & Co., of Liverpool, under date of February 19 says of tin and terne plates: "Our quotations show reductions during the five weeks past, and there are but few makers who have a stock of order to fill. All are willing sellers, and many will take reductions on their quotations. Through the competition of second-hand lots, coke tins are procurable of good common grade at 16s. 6d. to 16s. 9d. There is no description that can be said to be in active demand. As soon as peace is definitely settled there is sure to be an improved feeling."

Lead.—There is practically nothing doing in this article, which makes it difficult to arrive at a true knowledge of prices. There is probably enough offering at $3.75@$3.80, however, to make this a quotation. The San Francisco *Commercial Herald* of Feb. 14 says: "The steamship South Carolina, for Panama, carried *en route* for New York, 205,000 lb. base bullion, and 120,000 lb. pig lead."

Messrs. Vivian, Younger & Bond say of lead: "There is a dragging market, and prices are about 10s. per ton easier all round. Soft English sold down to £18 12s. 6d., and good soft Spanish down to £18 7s. 6d."

Spelter and Zinc.—These are very quiet. Spelter is quoted at 5⅝@5½, and sheet zinc in a jobbing way at 6¼c.

Messrs. Vivian, Younger & Bond say: "Spelter is sluggish, and prices again easier for the month at £18 17s. 6d., down to £18 15s. for ordinary foreign brands. The stock of spelter in London on the 31st January, 1878, was 166 tons, against 231 tons end of previous month, and 171 tons 31st January, 1877."

Antimony has been in good request, and under a scarcity is advancing in price. Sales of Cookson's have been made at 12¼@12½c., gold; and Hallett's at 12⅛@12¼c., closing at the higher quotations. The price in London has advanced £1, making it impossible to import and cover cost at the present selling prices. The tendency is upward.

Quicksilver.—The San Francisco *Commercial Herald* of the 14th inst. says of this article: "Supplies of late have been greatly restricted by reason of heavy rains, bad roads and floods. This lessened supply checked the recent decline and enabled holders to obtain a slight advance in rates. As stated in our last, the City of Tokio for Hongkong carried 1,336 flasks. The present market price may be quoted at 43 @ 44c., with a restricted business. Receipts for the week, 907 flasks."

Our monthly receipts of this article compare with 1876 as follows:

	1877—Flasks.	1878—Flasks.
January	5,414	4,290
	Flasks.	Value.
Total exports since Jan. 1, 1878	3,497	$118,338
Total exports same period 1877	5,017	191,149
Decrease this year	1,520	$72,811

Salt Lake Ore and Metal Market.

SALT LAKE CITY, Utah, Feb. 13, 1878.

Argentiferous Lead (Base Bullion), $31 per ton for lead; $1.15 per ounce for silver; $20 per ounce for gold. The quotations for silver are based upon the silver in the lead of 80 to 120 ounces per ton of 2,000 lb.

The *Inter-Ocean's* correspondent under date of the 8th inst. says:

"There is no change in the bullion market, and the only business doing is the delivery on old contracts and the shipments of the production of the Mingo Furnace, which belongs to the Pennsylvania Lead Company, Pittsburg.

"The highest offer that could be got to-day for bullion was $25 for lead and $1.15 per ounce for silver. Of course it was not accepted, but it shows the condition of our market.

"Professor Holden's case is adjourned till Monday, to enable him to introduce testimony *en route* by mail from Cleveland. As soon as these documents are introduced the defense is complete, when the rebuttal will be introduced and the case finished up.

"It appeared in evidence to-day that the product of the mine, from Feb. 1, 1876, to Jan. 1, 1878, was 77,584,277 pounds, and was sold for $935,082.77, besides $45,000 worth sold to Sheridan Hill Furnace. It also appeared that the cost of production was 47 per cent. of the gross sales, leaving a net profit of 53 per cent., which is not very bad."

FINANCIAL.

New York Stocks.

NEW YORK, Thursday Evening, Feb. 21, 1878.

The business in the coal shares has become so small as to attract but little attention; and even this busi-

ness greatly exagerates the *bona fide* sales. Delaware & Hudson has been dealt in for the five days to the extent of 7,938 shares at 47½@46⅝, closing at the latter price. The sales of Delaware, Lackawanna & Western Railroad have aggregated 50,755 shares, 48¼@47⅜, closing at 47½. The sales of New Jersey Central amount to 1,761 shares at 16¼@17⅝, closing at 17⅜.

Delaware, Lackawanna & Western R. R. Co.'s Annual Statement.—The annual report to the State of Pennsylvania by the auditor of the Delaware, Lackawanna & Western Railway Company shows that the net earnings from transportation amounted, during the year, to..... $4,401,858
And the losses on coal to..... 1,922,660

Leaving as balance..... $2,479,198

This total of $2,479,198 is subject to the following charges:

Interest on bonds.....	$201,957
Rentals.....	3,185,262
	$3,387,219
Deficit.....	$908,021

The company's bonded debt is $3,015,100 and includes only $195,000 of the recently authorized consolidated mortgage. It has then about $7,000,000 borrowing power unused.

The floating debt at the close of the year 1877 was $1,693,469.

The following is the condensed balance sheet:

GENERAL STATEMENT DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY, DECEMBER 31, 1877.

Liabilities.

Capital stock.....		$26,200,000 00
Bonded debt:		
Second mortgage bonds.....	$1,633,000 00	
Convertible bonds.....	600,000 00	
Consolidated mortgage bonds	195,000 00	
L. and B. R. R. Co.....	587,100 00	
		3,015,100 00
Floating debt:		
Bills payable.....	$1,939,462 10	
Taxes (due to Dec. 31).....	264,986 39	
Vouchers and accounts (for supplies to Dec. 31).....	909,301 06	
December pay-rolls, payable in January, 1878.....	285,421 50	
Interest on bonds and dividends (past due and accrued to Dec. 31).....	74,535 99	
Rental of leased lines payable on and after Jan. 1, 1878.	1,046,183 08	
Bonds and mortgages assumed (on real estate for construction).....	160,101 13	
Sundry small items.....	1,249 62	
Deduct	$4,681,240 87	
Cash on hand.... $360,970 77		
Coal on hand.... 217,314 00		
Bills receivable.. 95,166 26		
Advances to leased roads for construction purposes.. 265,387 21		
Advances on coal to be delivered. 452,353 98		
Accounts receivable..... 1,596,878 66		
	2,988,070 88	
		1,693,169 99
Income Account—		
Net earnings from Transportation Department, etc., 1877.....	$4,401,858 39	
Less loss in Coal Department, etc., 1877.....	1,922,660 99	
Balance of earnings....	$2,479,197 40	
Int't on bonds for 1877..... $201,957 00		
Rent's on b'ds for 1877..... 3,185,262 34		
	3,387,219 34	
Loss for year 1877 (equal to 3 46-100 per cent. on capital stock).....	$908,021 94	
Cr. balance of account Dec. 31, 1876.....	5,213,437 78	
		4,305,415 84
Total.....		$35,213,685 83

Assets.

Construction.....	$28,817,008 44
Changing gauge.....	804,864 78
Materials on hand.....	983,401 77
Stocks and bonds, par value being $5,596,887.09.....	4,608,409 84
Total.....	$35,213,685 83

NOTE.—Construction account represents the cost of 195 miles of railroad in Pennsylvania, or 316 miles of single track, 226 miles of which is laid with steel rails; 158 locomotives and 16,300 cars of different classes; over 15,000 acres of coal lands with improvements thereon; real estate in New York city, Buffalo, Rochester, Chicago and Staten Island, with twenty-eight coal barges.

The above report, like its predecessors, is of but little use to holders of the stock or intending investors.

At the annual meeting of the Delaware, Lackawanna & Western Railroad Company, on the 19th inst., the following gentlemen were elected: President, Samuel Sloan; Secretary, Frederick C. Chambers; Treasurer, Frederick H. Gibbens; Managers, William E. Dodge, Moses Taylor, George Bulkley, John J. Blair, S. B. Chittenden, John Brisbin, George Bliss, Percey R. Pyne, William Walter Phelps, Wilson G. Hunt, Alfred L. Dennis, Benjamin G. Clark, William Ryle, E. W. Holbrook.

Chesapeake & Ohio Canal.—A bill has passed the Maryland Senate authorizing this company to issue bonds to the amount of $500,000 to be used in maintaining this highway.

Chesapeake & Ohio R. R. Company.—$5,000 first-mortgage bonds at 21¾ per cent.

Miscellaneous Stocks and Quotations.

Sales and quotations of the stocks and bonds dealt in here, at Philadelphia and Baltimore for the week ending the 21st inst are given in the following tables. The Philadelphia quotations will have a * affixed. The Baltimore quotations are indicated thus †.

STOCKS.	Par Value.	High'st	Lowest	Closing	Sales: Shares.
American Coal Co.	$25	.....	.....	31	.....
St. L., I. M. & S. R. Co..	100	5¾	.....	5½	.....
Spring Mt. Coal Co.	50	.....	.....	35	.....
*Cambria Iron Co..	50	.....	.....	51	.....
*Penn. Salt Mf'g Co.	50	.....	.....	65	2
*Westm'land C. Co.	50	.....	.....	65	.....
*Buck Mt. Coal Co..	50	.....	.....	30	.....
*Schuyl. Nav. Co...	50	.....	.....	.....	.....
†Balt. & O. RR. Co. pf	100	94	.....	.....	.....
" " " " com	100	84	82½	.....	.....
†George's C'k C. Co	100	.....	.....	.....	.....
†S. Clara M'g Co...	100	.....	.....	.....	.....
†Atlantic Coal Co.	10	.....	.....	1.20	.....

BONDS.	Princ'l. When Due.	Int'est. When Due.	Hig'st.	Lowest	Amount.
D., L. & W., 7s, conv	1892	J. & D.	.....	.....	.....
" " " " 2d mtge.	1881	M. & S.	.....	.....	.....
N. J. C., 1st mtge. new	1890	F. & A.	110	.....	$41,000
" " " 1st mtge., con	1899	Q.	66	.....	3,000
" " " convt.....	1902	M. & N.	65	.....	5,000
Lehigh & W. B., con	1899	Q.	35½	.....	11,000
Am. Dock & Imp. 7s	.....	J. & J.	43	.....	2 000
St. L. I. M. & S., 1st mt	1892	F. & A.	.....	.....	.....
Ches. & O., 1st mtge	1899	M. & N.	.....	.....	.....
D. & H. C. Co., 1st m. rg	1884	J. & J.	93⅞	.....	2,000
" " " " "	1891	J. & J.	97	.....	2,000
" " " " m. loan cp	1894	A. & O.	95½	95	7,000
" " " " " rg.	1894	A. & O.	.....	.....	.....
" " " " new mge.	.....	.....	.....	.....	.....
*L. V. R., 1st m. 6s. cp.	1898	J. & D.	.....	.....	.....
" " " " rg.	1898	J. & D.	.....	.....	.....
" " 2d m. 7s, rg.	1910	M. & S.	116½	.....	1,000
" " con. m. 6s, rg	1823	J. & D.	97½	97	14,000
" " " 6s cp.	1923	J. & D.	96¾	.....	18,000
*Pa. RR., 1st m. 6s, cp	1880	J. & J.	104¾	.....	2,000
" " g. m., 6s, cp.	1910	J. & J.	.....	.....	.....
" " " 6s, rg.	1910	A. & O.	.....	.....	.....
" " con. m. 6s, rg.	1905	Q.	.....	.....	.....
" " " 6s, cp.	1905	J. & D.	92½	.....	10,000
" " new loan, 5s	.....	.....	110¾	110½	5,500
*P. & R. R., 1st m. 6s, R. C. 43-44.....	1880	J. & J.	103	.....	2,000
P. & R. R., 1st m. 6s, R. C. 48-49.....	1880	J. & J	.....	.....	.....
P. & R. R., 2d m. 7s cp	1893	A. & O.	.....	.....	.....
" " " scrip....	1882	J. & J.	60	.....	90
" " " in. m. 7s, cp	1896	J. & D.	60	.....	1,000
" " " c. m. 7s, cp.	1911	J. & D.	100	.....	10,000
" " " 7s. rg.	1911	J. & D.	100½	100¼	9,000
" " " cvt. 7s, R. C	1893	J. & J.	49	*28	1,100
" " C. & I. Co., Deb 7s, R. C.....	1892	M. & S.	.....	.....	.....
P. & R. C. & I. Co., m. 7s, R. C.....	'92-3	various	.....	.....	.....
L. Nav. Co., 6s, rg. m.	1884	J. & Q.	.....	.....	.....
" " RR., rg. m.	1897	F. & Q.	103½	102½	6,200
" " cvt. co. G. R.	1894	M. & S.	.....	.....	.....
" " " Gold R. C.	1897	J. & D.	88	87½	1,500
" " con. m. 7s, rg.	1911	J. & D.	.....	.....	.....
*P. & N. Y. C., 7s, R. C.	1896 / 1906	J. & D.	.....	.....	.....
*Pa. Canal, 6s. cp..	1910	J. & J.	.....	.....	.....
*Schuyl. Nav., 1st m. 6s. rg.....	1897	M. & Q.	.....	.....	.....
*Sus. Coal, 6s, rg...	1911	J. & J.	.....	.....	.....
†Balt. & O. RR., 6s..	1880	J. & J.	.....	.....	.....
" " " " 6s..	1885	A. & O.	.....	.....	.....

Total transactions for the week..... $154,390

* Ex-coupon.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, Feb. 21, 1878.

The dealings in the coal stocks in this market have been quite limited, and prices have declined in all cases. Lehigh Coal and Navigation, with sales of 1,929 shares, has declined from 17¾ on Saturday to 16⅞ at the close to-day; Lehigh Valley from 39¼ to 38¾, with sales of 843 shares; Pennsylvania R. R. from 29⅞ to 29⅛, with sales of 27,494 and Philadelphia & Reading from 15½ to 14⅝, with sales of 8,492 shares.

Reading Railroad Co.—This company is repairing its engines, planes, tracks and machinery generally. The Gordon planes have been overhauled, and the Mahanoy plane is now to receive an extensive fixing up, that will prevent its use until the beginning of March. Meanwhile, the coal usually passing over it will be divided, part going over the Gordon planes and part through the Mahanoy Tunnel. This is also the season for making repairs at the collieries, and they are generally being put in order. In the Lykens Valley District, as we learn from the Lykens *Register* of last week, "contracts for gangways, chutes and leadings were given out by the Lykens Valley Coal Company sufficient to give employment to about 100 men."

Pennsylvania R. R. Company.—The annual meeting of the stockholders of this company will be held March 12.

The United Companies of New Jersey.—The report of the operations of the United Companies of New Jersey for 1877, made to the State of New Jersey, shows net earnings of railroads, $2,314,933; of canal, $418,962; total net earnings, $2,732,966. To this is added $221,525 interest received from investments, making a total of $2,954,521. Out of this $2,368,589 were paid for debt, interest and taxes, leaving $585,932 available for dividends. The capital of the United Companies is $20,190,400, and the funded debt $19,899,116.

AUCTION SALES.—During the week the following stocks and bonds were disposed of at auction:

Philadelphia & Reading C. & I. Co.—$9,000 7s at 61@63¼ per cent., $1,000 do. do., deb. 7s @ 41¼ per cent.

Tremont Coal Co.—$2,500 7 per cent. bonds at 91@86 per cent.

Huntingdon & Broad Top Mt. R. R.—$4,000 cons. 7s @ 28½ per cent.

Schuylkill Nav. Co.—$8,000 6s at 60¼@60.

Reading R. R.—$300 conv. 7s at 29 per cent., $465 scrip bonds @ 50¼ per cent.

Pennsylvania R. R.—$3,000 gen. mtg. 6s @ 106¾.

Copper Stocks.

Reported by Wilson W. Fay & Co., Brokers in Mining and Miscellaneous Stocks, Room 7, Traveller Building, 31 State street.

BOSTON, Wednesday Evening, Feb. 20, 1878.

The market continues comparatively active, with favorable indications of a general stirring up in these stocks; the general tendency during the week has been to raise prices and create an interest in the stocks that have been torpid so long.

Although the number of transactions does not exceed to any extent the average amount, yet the prevailing feeling seems to be to stir up some of these copper stocks and make some business in them.

Calumet & Hecla has advanced rapidly from 177¾ to 181 bid, and 181⅞ asked, and sales at 178—180—180¼, and as high as 182, but is a trifle weaker at the close.

Copper falls has stiffened a little, having had a slight reaction after the break, and closes 2⅜@2½.

Franklin is looking better, there being a demand for it at 7.00 and stock offered at 7⅛, and no transactions.

Osceola has advanced to 12 bid and 13 asked, and sales at 12.

Pewabic remains unchanged.

Quincy is about the same, being a trifle firmer if anything, and closes 35@36, and sales at 35½ and 36.

Ridge closes 1⅜@1½, and rather weak.

Duncan Silver has declined on receipt of the last letter from the mine, which although containing no very startling announcements, was on the whole very encouraging and did not justify the decline. The stock went down to 1⅞, but is firmer now at 1 15-16 bid, and 2⅛ asked; all the stock offering at 2.00 having been taken.

International is quiet at .30 bid and .33 asked.

Merrimac Silver (old stock) closes 3⅛@3½.

Humboldt Copper Mining Co.—The annual meeting of the stockholders of this company will take place March 26.

Gold and Silver Stocks.

NEW YORK, Thursday Evening, Feb. 21, 1878.

The business at the Mining Exchange during the week under review has not been so great as it was for the two previous weeks. There is evidently, however, fully as much interest being shown, and the extensive dealings in the cheap non-dividend stocks are undoubtedly the result of inexperienced operators endeavoring to familiarize themselves with the market at but a slight risk. As our dividend-paying mines become better known, there will soon be an inclination to deal in them. Before a really important interest will be taken in mining stocks, the list of valuable mines with transfer offices in this city will have to be increased. This will probably not occur until the Bank of Nevada opens its branch here, as it is fully believed that it will do. When this is done there will be attracted to this market many good mines in Utah, Colorado and elsewhere that have no representation anywhere. Heretofore the owners of these mines have not considered the prospects of securing a market here for their stocks as sufficient to warrant their being placed on the list.

When the Mining Exchange was first established it was said by speculators that among its members there were few if any reliable houses with which business could be done. Such is not the case now, and constantly is the list being strengthened. We note the following new admissions to the Exchange on Monday: James D. Smith, of Jameson, Smith & Cotting; T. B. Atkins, of Chase & Atkins; George F. Cummings, of Cummings & Co.; Morris Imbrie, of Voorhees & Imbrie, and A. W. Dimock. Among the list of applicants for admission we note the names of Henry N. Smith, C. J. Osborn, of C. J. Osborn & Co.; Eugene N. Robinson, of Eugene N. Robinson & Co., and Jas. Soutter.

On the 8th inst. the admission fee to the Mining Exchange was advanced from $500 to $1,000, and the initiation fee from $50 to $100.

On Saturday and Monday there were dealings in Hukill amounting to 650 shares at $4.60@4.50. Moose has ranged between 8 and 8½, with sales of 12,100. The sales of Ontario aggregate 855 shares at 31@31½; King's Mountain 2,425 shares at $3.20 @3. In the lower priced stocks the dealings have been: American Flag, 12,600 shares at 19@24c.; Bertha and Edith, 73,850 shares at 12@17c.; Lacrosse, 61,800 shares at 63@71c.

The *Post* says:

"Governor Hubbard, of Connecticut, has sent a special message to the State Legislature, asking it to correct the present lax joint-stock laws. Under them joint-stock companies have been allowed to be formed with startling amounts of nominal capital by persons utterly bankrupt, and to start business with nothing at all or with a minimum percentage of no capital stock paid in. The Gold Placer Mining Company, with $5,000,000 of capital, and the American Consolidated Gold and Silver Mining Company, with $1,000,000, are given as allowed to begin business under the laws of Connecticut without a cent paid in by either."

The Eureka Consolidated Company has declared its regular dividend of $3 per share, and it is said that the Richmond Consolidated, will declare a quarterly dividend of $3 per share.

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

COAL STOCKS.

NAME AND LOCATION OF COMPANY.		Feet on Vein.	Capital Stock.	SHARES. No.	Par Val.	ASSESSMENTS. Total levi'd to date.	Date and amount per share of last. Mo.	Yr.	Amt.	DIVIDENDS. Total paid to date.	Last Dividend. Mo.	Yr.	Amt.	Rate per Ann.	HIGHEST AND LOWEST PRICES PER SHARE IN CURRENCY AT WHICH SALES WERE MADE. N. B.—Quotations of D., L. & W. R. R., and Pa. Coal Co. are per $100—two shares. Feb. 16. H.	L.	Feb. 18. H.	L.	Feb. 19. H.	L.	Feb. 20. H.	L.	Feb. 21. H.	L.	Feb. 22. H.	L.	SALES.
			$		$					$				Per c'nt													
Consol. Coal	Md.		10,250,000	102,500	$100	*					Jan.	1877	2½															
Del. & H. Canal	Pa.		20,000,000	200,000	100	*				38,821,104	Aug.	1876	4	9	47¼	46¾	47½	46¼	46¾	46¾	47	46¼	46¼	46¾			7,938
Del., Lac. & W. R. R.	Pa.		26,200,000	524,000	250	*					July	1876	2½	5	48¾	47½	48¼	47⅜	47⅜	47⅜	48⅛	47⅜	47¾	47⅜			50,755
Lehigh C. & Nav.	Pa.		10,448,550	208,971	50	*					Nov.	1876	1½	5½	17¾	17½	17½	17⅜	17¼	17⅛	17⅛	16¾	17	16⅞			1,929
Lehigh Valley R. R.	Pa.		27,042,900	540,858	50	*											39¼	38⅞	39	38¾	39	39	39	38¾			843
Maryland Coal	Md.		4,400,000	44,000	100	*					Jan.	1876	1½	1½													
N. J. Central R. R.	Pa.		20,000,000	200,000	100	*					Apr.	1876	2½	2½	16½	16¼	16½	16¼	17	16¾	17⅛	16¾	17⅜	17⅜			1,761
Pennsylvania Coal	Pa.		5,000,000	100,000	50	*					Feb.	1878	3														
Pennsylvania R. R.	Pa.		68,870,200	1,337,404	50	*					May	1877	1½	8	20⅞	20⅜	20½	20¼	20⅜	20¼	20½	20¼	20¼	20⅛			27,494
Phil. & Read. R. R.	Pa.		34,278,175	685,563	50	*				43,012,497	Jan.	1876	2½†	10	15½	15⅛	15¼	15	15	14⅞	15	14⅞	14¾	14⅝			8,492

GENERAL MINING STOCKS.

Dividend Paying Mines.

American	Col.		1,000,000	100,000	10	*				30,000	Feb.	1878	$0 10	12			10½											100
Belcher, g. s.	Nev.	1,040	10,400,000	104,000	100	1,176,400	Dec.	1877	1 00	15,397,200	Apr.	1876	1 00	12														
Bobtail, g.	Col.	2,500	1,136,630	227,326	5	*				56,831	Nov.	1877	25															
Bobtail Tunnel, g.	Col.		100,000	20,000	5	52,000	July	1873	0 30	40,000	Dec.	1877	50	20														
California, g. s.	Nev.	900	54,000,000	540,000	100					23,760,000	Feb.	1878	2 00	24														
Calumet & Hecla, c.	Mch		2,000,000	80,000	25	1,200,000				12,250,000	Oct.	1877	5 00	20														
Central, c.	Mch		500,000	20,000	25	100,000	June	1862	0 65	1,260,000	Feb.	1878	5 00															
Chollar Potosi, g. s.	Nev.	1,400	2,800,000	28,000	100	1,578,000	Jan.	1878	3 00	3,040,000	Feb.	1872	1 00															
Copper Falls, c.	Mch		1,000,000	20,000	50	535,000	May.	1876		100,000	Nov.	1871	1 00															
Cons. Virginia, g. s.	Nev.	710	54,000,000	540,000	100	474,600	June	1873	3 00	37,800,000	Feb.	1878	2 00	24														
Confidence, g. s.	Nev.	130	2,496,000	24,960	100	243,840	Mar.	1873	1 00	78,000	May.	1865	8⅛	8½														
Cons. Her. & Roe	Col.	16,500	1,300,000	100,000	10	*				120,000																		
Crown Point, g. s.	Nev.	600	10,000,000	100,000	100	1,673,370	Jan.	1878	1 00	11,588,000	Jan.	1875	2 00	24														
Eureka Cons., g. s. l.	Nev.		5,000,000	50,000	100	100,000	May	1876	1 00	1,450,000	Jan.	1878	3 00	24														
Eureka G. Mg., g.	Cal.	1,680	2,000,000	20,000	100					2,134,000	Aug.	1877	2 00															
Franklin, c.	Mch		500,000	20,000	25	360,000	June	1876	5 00	585,000	Nov.	1871	1 00															
Gould & Curry, g. s.	Nev.	612	10,800,000	108,000	100	2,558,000	Dec.	1877	1 00	3,826,800	Oct.	1870	10 00															
Grand Prize	Nev.									1,200,000	Jan.	1878	1 00															
Hale & Norcross, g. s.	Nev.	400	11,200,000	112,000	100	2,746,000	Dec.	1877	1 00	1,598,000	Apr.	1871	5 00	12														
Hukill, g. s.	Col.	3,288	1,000,000	100,000	10	*				130,000	Feb.	1878	0 10	12	4.60	4½	4½											650
Kentuck, g. s.	Nev.	95	3,000,000	30,000	100	270,000	Dec.	1874	1 00	1,252,000	Mar.	1870	5 00															
Leopard, l. g. s.	Nev.	1,500	5,000,000	50,000	100	100,000	July.	1877	50	162,500	Dec.	1876	0 50															
Merrimac, s.	Mas.	1,500	500,000	100,000	5	*				110,000	Jan.	1878	0 10	12														
Minnesota, c.	Mch.		1,000,000	20,000	50	436,000	June	1869	1 00	1,820,000	Mar.	1876	0 50															
Moose	Col.	39,000	2,000,000	200,000	10	*				175,000	Jan.	1878	0 25	10	8¼	8	8⅛	8¼	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛			12,100
National, c.	Mch.		500,000	20,000	25	195,000	Oct.	1875	1 00	360,000	Oct.	1873	1 00															
N. Y. & Colorado, g.	Col.		1,000,000	50,000	20	*				20,000	Mar.	1877	0 20		2.60						2.60	2.40						500
Northern Belle, s.	Nev.	1,600	5,000,000	50,000	100					1,400,000	Oct.	1877	1 00															
Ontario	Uth.	3,000	10,000,000	100,000	100					900,000	Jan.	1878	0 50	6	31½	31	31½	31⅜	31½				31½					855
Ophir, g. s.	Nev.	675	10,080,000	100,800	100	3,035,200	Jan.	1878	1 00	1,394,400	Mar.	1864	4 00															
Pewabic, c.	Mch.		500,000	20,000	25	185,000	June	1868	3 00	460,000	July	1873	1 00															
Phoenix, c.	Mch.		1,000,000	20,000	50	817,500	Sept.	1870	3 00	20,000	Jan.	1876	1 00															
Polar Star, g. s.	Col.	1,300	500,000	50,000	10	*				5,000	Jan.	1878	0 10															
Quincy, c.	Mch.		200,000	20,000	10					2,130,000	Feb.	1877	4 00															
Raymond & Ely, g. s.	Nev.	5,000	3,000,000	30,000	100	540,000	Dec.	1876	1 00	3,075,000	Sept.	1873	3 00															
Ridge, c.	Mch.		500,000	20,000	25	200,000				90,000	Feb.	1875	1 00															
Rye Patch	Nev.	3,000				97,500	Nov.	1876	0 50	150,000	Dec.	1877	0 25															
St. Joseph, l.	Mo.	2,000 acs.	1,000,000	100,000	10					250,000																		
Savage, g. s.	Nev.	800	11,200,000	112,000	100	3,650,500	Jan.	1878	1 00	4,460,000	June	1869	3 00															
Seaton, g. s.	Col.	1,700	500,000	50,000	10	*				10,000	May	1877	0 10	12	2.55		2½				2½	2.40						600
Sierra Nevada, g. s.	Nev.	3,650	10,000,000	100,000	100	1,000,000	Jan.	1878	0 50	102,000	Jan.	1871	1 00	10														
Silver King										150,000	Jan.	1878	0 50															
Standard	Cal.									250,000	Jan.	1878	1 00															
Yellow Jacket, g. s.	Nev.	1,200	12,000,000	120,000	100	3,438,000	Jan.	1878	2 00	2,184,000	Aug.	1871	2 50															

Non-Dividend Mines.

Allouez, c.	Mch.		1,000,000	20,000	50	940,000	May	(1876)	5 00																			
Alpha, g. s.	Nev.	300	3,000,000	3,000	100	210,000	Aug.	1877	1 00																			
Am. Flag, c.	Col.	5,300	600,000	60,000	10	*									21c	19c	20c		20c	19c	20c	18c	24c	21c			12,600
Bertha & Edith, g.	Vir.	645 acs.	3,500,000	350,000	10	*									15c	12c	16c	13c	17c	15c	16c	14c	17c	14c			73,850
Best & Belcher, g. s.	Nev.	545	10,080,000	100,800	100	337,792	Aug.	1877	1 00																			
Bullion, g. s.	Nev.	943½	10,000,000	100,000	100	2,802,000	Jan.	1878	1 00																			
Caledonia, g. s.	Nev.	2,188	10,000,000	100,000	100	1,435,000	Oct.	1877	0 75																			
Cleveland, g.	Col.	3,715	250,000	25,000	10	*																						
Cons. Imperial, g. s.	Nev.	468	50,000,000	500,000	100	575,000	Oct.	1877	0 20																			
Con. N. Slope & E. C.T.	Col.	15,000	500,000	10,000	50	*																						
Dana, c.	Mch.		500,000	20,000	25	68,000	Jan.	1863	0 50																			
Dawson, s.	Ont.		1,200,000	60,000	20																							
Duncan, s.	Ont.		1,200,000	60,000	20	75,000	July	1876	41⅔																			
Exchequer, g. s.	Nev.	400	10,000,000	100,000	100	380,000	Jan.	1878	1 00																			
Granville, g.	N. C.	9,000	1,000,000	100,000	10	*																						
Humboldt, c.	Mch.		500,000	20,000	25	100,000	Sept	1876	0 15																			
International, s.	Ont.		1,200,000	60,000	20																							
Julia, g. s.	Nev.	3,000	11,000,000	110,000	100	525,000	Jan.	1878	0 75																			
Justice, g. s.	Nev.	2,100	10,500,000	105,000	100	2,237,500	Jan.	1878	2 00																			
Kings Mountain, g.	N. C.		1,200,000	120,000	10	*									3.05	3	3.20	3	3		3.10	3	3				2,125
Lacrosse	Col.	3,900	1,000,000	100,000	10	*									68c	63c	71c	64c	71c	67c	70c	65c	70c	67c			61,800
Lucerne	Col.	4,200	5,000,000	500,000	10	*																						
Madison, c.	Mch.		500,000	20,000	25	123,000	Sept	1876	0 10																			
Mariposa preferred	Cal.	44,387	5,000,000	50,000	100	1,425,000	June	1877	1 00																			
" common	Cal.	acres.	10,000,000	100,000	100	1,425,000	June	1877	1 00										2½		2.20							300
Memphis	Col.	6,000	300,000	60,000	5	*									30													100
Mesnard, c.	Mch.		500,000	20,000	25	160,000	Apr.	1876	0 50																			
Mexican, g. s.	Nev.	600	10,080,000	100,800	100	181,440	Aug.	1877	0 30																			
Overman, g. s.	Mch.		1,000,000	40,000	25	100,000	Jan.	1878	3 00																			
Osceola, c.	Nev.	1,200	3,840,000	38,400	100	2,567,880	Nov.	1877	3 00																			
Petherick, c.	Mch.		500,000	20,000	25	165,533	Mar.	1876	0 50																			
Pleasant View, g.	Col.	1,200	200,000	20,000	10	*																						
Quicksilver preferred	Cal.	8,500	4,291,300			*																						350
" common	Cal.	acres.	5,708,700	100,000	100																		30½	30				200
Rockland, c.	Mch		500,000	20,000	25	495,000	Jan.	1874	1 00														18					
Seg. Belcher, g. s.	Nev.	160	840,000	8,400	100	244,800	Apr.	1876	5 00																			
Silver City, g. s.	Nev.	3,900	6,310,000	63,100	100	15,775	Nov.	1875	0 25																			
Silver Hill, g. s.	Nev.	5,400	5,400,000	54,000	100	192,600	Dec.	1877	1 00																			
Star, c.	Mch.		500,000	20,000	25	265,000	Mar.	1876	0 50																			
Superior, c.	Mch.		500,000	20,000	25	340,000	Mar.	1874	0 25																			
Union Cons. g. s.	Nev.	850	10,000,000	100,000	100	285,000	Oct.	1877	0 25																			

g. Gold. s. Silver. l. Lead. c. Copper. * Non-Assessable.

Total Assessment levied to date..... 47,949,330 | Total Sales of Coal Stocks for the week..... 79,212 shares.
Total Mining Dividends to date..... 217,000,832 | Total Sales of Mining Shares for the week..... 166,430 "

† A dividend of 3½ per cent. was declared on the preferred stock of this Co. in July.

The Production of the Ontario Co. from February 1 to 14 was 40 bars of bullion, having an assay value of $85,295.96. A recent letter from the Superintendent of this company, dated the 7th inst., says: "The mine throughout the stopes is showing full as well as at any previous time. The 500 level is now into the heading east of shaft 220 feet, with good ore the entire distance. The same level is also driven 207 feet west of shaft, all of which will pay well, and the last few feet of the lode is widening, with high-grade ore.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 16.	Feb. 18.	Feb. 19.	Feb. 20.	Feb. 21.	Opening. Feb. 22.
Alpha	10½	10½	10½	10¼	.....	.....
Belcher	5	5	5	4½	.....	.....
Best & Belcher	18¼	18¼	18¼	18¼	.....	.....
Bullion	3¾	3¾	3¾	3¾	.....	.....
Caledonia	2½	2½	2½	2½	.....	.....
California	27¾	28	27¾	28	.....	.....
Chollar-Potosi	33½	32½	33	32¾	.....	.....
Con. Imperial	1	1	1	1	.....	.....
Con. Virginia	22¼	22	22¼	22¼	.....	.....
Confidence	4½	4½	4½	4½	.....	.....
Crown Point	5¼	5¼	5	4½	.....	.....
Eureka Con	44¾	45	45½	*44½	.....	.....
Exchequer	2¼	3½	3½	3½	.....	.....
Gould & Curry	8¼	8¼	8¼	8¼	.....	.....
Grand Prize	13	13	12¾	12¾	.....	.....
Hale & Norcross	10¼	10¼	10½	10½	.....	.....
Julia	2¼	2¼	2¼	2¼	.....	.....
Justice	11¼	11¼	11	11	.....	.....
Kentuck	3½	3½	3½	3½	.....	.....
Mexican	13¼	13¼	13¼	13¼	.....	.....
Northern Belle	11	11	11	10¾	.....	.....
Ophir	53	51½	52¼	53¾	.....	.....
Overman	15½	15½	16	15¼	.....	.....
Raymond & Ely	5¾	5½	5½	5½	.....	.....
Silver Hill	2¾	3	3	3	.....	.....
Savage	11¾	11½	11¾	11¾	.....	.....
Seg. Belcher	26½	26½	28	28	.....	.....
Sierra Nevada	4	4	4	4	.....	.....
Union Con	6	6	6	5¾	.....	.....
Yellow Jacket	10½	10¼	10½	10½	.....	.....

The Gold Hill *News* of the 13th inst. says in its mining news:

"The hesitating condition of stocks has been ascribed in a great part to the depressing influence of the bill recently introduced into the California Legislature, to appoint a Grand Pasha or Censor over the entire mining interests of the Pacific Coast. Legislation that will strengthen and protect mining interests is a good thing and in some respects much needed; but we want nothing that is going to take away not only all corporate rights, but all individual rights as well.

"If the Legislature of California want to aid the mining interests, let them make a law that will reach and protect in some way the rights of the minorities in stock corporations, so that, as in the case of the Justice and the Woodville mines, the innocent holders of 59,999 out of 120,000 shares of the stock cannot be robbed of their undisputed rights. So far as the mines are concerned the outlook continues bright and prosperous.

"The final clean up of the bonanza mines for last month shows a total yield of $3,387,231. The mills are all busy, and the past few days' snow insures the millmen plenty of water with which to run the river mills during the coming spring and summer.

"The Sutro Tunnel is gradually nearing the Comstock, and the blasts in the header can now be distinctly heard by the miners at work on the 2,000 level of the Savage and Hale & Norcross shafts. The pumps in both the Savage and Hale & Norcross shafts are working to perfection, having entirely drained the large drifts and cross-cuts on the 2,000 levels of these mines during the week, and being now almost ready to make a start for the 2,100 level, which they must reach, at the present rate, in a very short time.

"The great heat in the Ophir is being rapidly overcome, and work is being resumed in all the drifts and winzes today, so that if nothing further happens to prevent, we must soon begin to learn the true value of the recent discoveries on the lower levels of that mine.

"A new and important discovery of a body of quartz and low-grade ore was struck day before yesterday in the east joint drift on the dividing line between the Union Consolidated and the Mexican mines, while at about the same time some very favorable quartz was struck in the bottom of the Ward shaft.

"Early in the week the Silver Hill cut a fine streak of ore, four feet thick, on their 600 level, assaying as high as $200 per ton, so that taken altogether we again say that the fault, if fault there is, is in the stock operators and not the mines."

Sutro Tunnel.—The total length of this work on the 13th inst. was 18,931 feet. The number of feet driven during the week was 51. The flow of water from the mouth of the tunnel is 1,286,500 gallons per day. The temperature of the air at the header is 108°. The ground in the face has every appearance of vein matter, and the tunnel may now be considered within the limits of the great Comstock vein fissure, the total distance to be driven to reach the lode be ng about 1,270 feet.

The Standard Mining Co. has declared a dividend of $1 per share.

The Empire Mining Co., Cal., has declared a dividend of 25c. per share.

Grand Prize Mining Co.—This company has declared its regular dividend of $1 per share.

Assessments with dates when delinquent: Overman $3, March 14; Union Cons. (Cal.), 25c., March 21; New Albany (Toulumne Co.), 60c., March 18; Little York. 15c., March 15; Amazon Con., 10c., March 17; Glasgow, 10c., March 17; Henrietta. 10c., March 12; Falcon, 15c., March 12; Belmont, 30c., March 8; Leopard, 50c., March 11; Northern Light. 25c., March 8; McClinton, 50c., March 18; Pawnee, 10c.; Bodie, 50c., March 18; Big Oak Flat Gravel Co., 40c., March 8.

Gas Stocks.

NEW YORK, Thursday Evening, Feb. 21, 1878.

No transactions are reported in gas stocks. The market is weak and we lower some of the quotations—notably those of the Williamsburgh and Harlem companies, each of which are $5 below the prices quoted in our last.

The Cincinnati Gas Question.—The following resolution recently passed the Cincinnati Common Council:

Be it ordained by the City Council of the city of Cincinnati, That for the period of ten years from and after the thirty-first day of March of the year eighteen hundred and seventy-eight, the Cincinnati Gas Light and Coke Company may charge for gas furnished of the standard quality to the public buildings, and to the citizens or private consumers of the city of Cincinnati at the rate of one dollar and seventy cents, exclusive of any tax that may be imposed on gas by the United States Government, each one thousand (1,000) cubic feet of gas so furnished, and said Cincinnati Gaslight and Coke Company shall, in no event, charge more for gas furnished to such public buildings or individuals than the price herein specified. Provided, however, that said company shall not charge rent for their meters to private of public consumers, and provided also that nothing herein shall be construed as a waiver by the city of Cincinnati to obtain possession of the works of said company at the expiration of said term of ten years. as provided by contract therewith.

The Inventor of Gas Lights.—The Inventor of gas lights is said to have been a Frenchman, Philippe Le Bon, an engineer of roads and bridges, who in 1772 adopted the idea of using, for the purpose of illumination, the gases distilled during the combustion of wood. He labored for a long time in the attempt to perfect his crude invention, and it was not till 1799 that he confided his discovery to the institute. In September, 1800, he took out a patent, and in 1801 he published a memorial containing the result of his researches. Le Bon commenced by distilling wood, in order to obtain from it gas, oil, pitch and pyroligeneous acid; but his work indicated the possibility of obtaining gas by distillation from fatty or oily substances. From 1799 to 1802, Le Bon made numerous experiments. He established at Havre his first theremo-lamps; but the gas which he obtained being a mixture of carbureted hydrogen and oxide of carbon, but imperfectly freed from its impurities, gave only a feeble light and involved an insupportable odor, and the result was that but little favor was shown to the new discovery; the inventor eventually died, ruined by his experiments. The English soon put in practice the crude ideas of Le Bon. In 1804, one Winsor patented and claimed the credit of inventing the process of lighting by gas; in 1805, several shops in Birmingham were illuminated by gas manufactured by the process of Winsor and Murdock; among those who used this new light was Watt, the inventor of the steam engine. In 1816 the first use was made of gas in London, and it was not until 1818 that this invention, really of French origin, was applied in France.

Visalia, Cal., will soon be supplied with gas.

Hagerstown, Md.—$3.25 per thousand is charged for gas in this place.

Baltimore.—The feasibility of lighting the street-lamps of this city with electricity, by which it is claimed a clear annual saving of $34,000 will be effected, is being considered.

St. Joseph, Mo., is without gas, and the result bids fair to involve the city in suits for damages.

The Milwaukee (Wis.) Gas Light Co. are about to improve and enlarge their works, adapting them to the prospective demands of the city for years to come. A new and large holder is to be built, and a 24-inch main laid under the river to better supply the West Side. This main will be laid in a dredged cut, in three sections, without interference to navigation.

Williamsburg Gas Light Co.—We note the sale at auction during the week of 20 shares of this Company's stock at $110½ per share; also, $10,000 of the 7 per cent. scrip certificates at 95 per cent.

Connellsville Gas Coal Co.—$4,700 6 per cent. bonds.

Boston (Mass.) Gas Co.—We note recent auction sales of the stock of this company at $815 per share.

In Detroit, Mich., there is a city gas inspector, whose business it is to make daily tests of the illuminating power of the gas supplied. The Gaslight Company's average for January was equal to 15·4 candles.

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